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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

NETFLIX, INC.,

Plaintiff,

v.

BROADCOM INC., VMWARE LLC

Defendants.

Case No. 3:25-cv-3738-TLT

AMENDED COMPLAINT FOR PATENT INFRINGEMENT

JURY TRIAL DEMANDED

Plaintiff, Netflix, Inc. ("Plaintiff" or "Netflix") hereby asserts the following claims for Patent Infringement against Defendants Broadcom Inc. ("Broadcom") and VMware LLC ("VMware"), and alleges as follows:

NATURE OF THE ACTION

1. This is a civil action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 1, et seq.

2. Defendants Broadcom and VMware, jointly and severally, have directly infringed and continue to infringe, have induced and continue to induce, and have contributed to and continue to contribute to infringement of one or more claims of U.S. Patent Nos. 10,331,472 (the "'472 Patent") and 7,313,102 (the "'102 Patent") through their development, use, and commercialization of the Broadcom Load Balancing Accused Products and Broadcom Subnet Provisioning Accused Products, respectively, as defined below. Defendant Broadcom has directly infringed and continues to infringe, has induced and continues to induce, and has contributed to and continues to contribute to infringement of U.S. Patent Nos. 7,649,912 (the "'912 Patent"), 7,447,931 (the "'931 Patent"), and 7,656,751 (the "'751 Patent") through its development, use, and commercialization of the Broadcom Switching Accused Products, as defined below. The '472 Patent, '102 Patent, '912 Patent, '931 Patent, and '751 Patent collectively, are referred to as the "Asserted Patents."

3. Netflix is the owner of the Asserted Patents, which were duly and legally issued by the United States Patent and Trademark Office ("USPTO"). For each of the Asserted Patents, Netflix owns all substantial rights to sue for infringement in its own name, including for past, present, and future damages, and injunctive relief.

4. Netflix seeks monetary damages as redress for Broadcom's and VMware's infringement.

THE PARTIES

5. Netflix is a Delaware corporation with its principal place of business located at 121 Albright Way, Los Gatos, California 95032.

6. Netflix was founded in Scotts Valley, California in 1997 and is an innovative video

on-demand streaming services company and one of the world's leading entertainment services bringing TV series, films, games, and live content to 278 million members in over 190 countries.

7. Broadcom is a corporation organized under the laws of the State of Delaware with regular and established places of business in this Judicial District, including offices in Palo Alto, Petaluma, and San Jose.

8. Broadcom's organizational history involves a complex web of mergers and acquisitions. In brief, in 1999, Hewlett-Packard's Semiconductor Products Group spun off as Agilent Technologies, which later formed Avago Technologies. Avago merged with and acquired multiple companies between 2005 to 2015. Then, in 2015, Avago announced it would buy Broadcom but adopt the Broadcom name because of its broader name recognition.[1] Broadcom today comprises an amalgamation of companies, including Brocade Communications Systems, CA Technologies, Symantec Enterprise Security, and Avago, among many others.[2] Broadcom is known to sell off its acquired companies for parts in a strategy summed up as: "Buy. Chop up. Sell off. Raise prices. Rinse. Repeat."[3]

9. On May 26, 2022, Broadcom and VMware Inc. entered into an Agreement and Plan of Merger (the "Merger Agreement"), and on November 22, 2023, Broadcom merged with or acquired VMware Inc. for $69 billion in a "transformational" transaction.[4]

10. The series of transactions and agreements executed between Broadcom and VMware Inc. that ultimately resulted in Broadcom's merger and/or acquisition of VMware Inc. is complex, perhaps intentionally so.

11. At the end of the transaction, VMware Inc. was renamed VMware LLC, and VMware

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[1] "Avago Technologies to Acquire Broadcom for $37 Billion," Broadcom.com (May 28, 2015), https://investors.broadcom.com/news-releases/news-release-details/avago-technologies-acquire-broadcom-37-billion.

[2] "Company History," Broadcom.com, https://www.broadcom.com/company/about-us/company-history.

[3] Joff Wild, "Five big patent talking points raised by Broadcom's proposed buy-out of Qualcomm," IAM (November 9, 2017), https://www.lexology.com/library/detail.aspx?g=925c5af8-43a7-480f-af7c-7dc896541c28.

[4] "Broadcom Inc. Announces Fourth Quarter and Fiscal Year 2023 Financial Results and Quarterly Dividend," Broadcom.com (December 7, 2023), https://investors.broadcom.com/news-releases/news-release-details/broadcom-inc-announces-fourth-quarter-and-fiscal-year-2023.

products were thereafter sold under the brand name "VMware by Broadcom."[5] VMware Inc. and VMware LLC are collectively referred to herein as "VMware."

12. VMware has a principal place of business in this District, at 3401 Hillview Avenue, Palo Alto, California, 94304.

JURISDICTION AND VENUE

13. Netflix brings this civil action for patent infringement under the Patent Laws of the United States, 35 U.S.C. § 1 et. seq., including 35 U.S.C. §§ 271, 281-285.

14. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338.

15. This Court has personal jurisdiction over Broadcom and VMware because they maintain their principal places of business in this District and engage in continuous and systematic business activities within this District.

16. Venue is proper in this District pursuant to at least 28 U.S.C. § 1400(b) because Broadcom and VMware maintain their principal places of business in this District, reside in this district, and have committed acts of patent infringement in this District.

BACKGROUND

17. This Amended Complaint asserts causes of action for infringement of the '472 Patent, the '102 Patent, the '912 Patent, the '931 Patent, and the '751 Patent, (as noted above, collectively, the "Asserted Patents").

18. The '472 Patent is entitled "Virtual Machine Service Availability." Bo Wang is identified on the face of the '472 Patent as the inventor. On June 25, 2019, the USPTO duly and legally issued the '472 Patent from Application No. 15/503,138, originally filed as PCT/CN2014/085541 on August 29, 2014. A true and correct copy of the '472 Patent is attached as Exhibit A. Netflix is the current owner by assignment of all rights, title, and interest in and under the '472 Patent, including the right to sue and obtain damages for past, current, and future infringement. Netflix has standing to sue for infringement of the '472 Patent.

[5] VMware.com, https://www.vmware.com/; VMware LLC Securities and Exchange Commission Form 8-K, (November 22, 2023), http://edgar.secdatabase.com/1558/119312523282097/filing-main.htm.

19. The '102 Patent is entitled "System and Method for Subnet Configuration and Selection." Bryan Craig Stephenson, Jennifer Jie Fu, Julie Kosakowski, Samuel L. Scarpello, Jr., Andrea Eakin, Jon Russell Sawyer, Rheid Schloss, and Ron MacDonald are identified on the face of the '102 Patent as the inventors. On December 25, 2007, the USPTO duly and legally issued the '102 Patent from Application No. 10/390,492, filed on March 17, 2003. A true and correct copy of the '102 Patent is attached as Exhibit B. Netflix is the current owner by assignment of all rights, title, and interest in and under the '102 Patent, including the right to sue and obtain damages for past, current, and future infringement. Netflix has standing to sue for infringement of the '102 Patent.

20. The '912 Patent is entitled "Time Synchronization, Deterministic Data Delivery and Redundancy for Cascaded Nodes on Full Duplex Ethernet Networks." Sivaram Balasubramanian, Anatoly Moldovansky, and Kendal R. Harris are identified on the face of the '912 Patent as the inventors. On January 19, 2010, the USPTO duly and legally issued the '912 Patent from Application No. 11/115,536, filed on April 27, 2005. A true and correct copy of the '912 Patent is attached as Exhibit C. Netflix is the current owner by assignment of all rights, title, and interest in and under the '912 Patent, including the right to sue and obtain damages for past, current, and future infringement. Netflix has standing to sue for infringement of the '912 Patent.

21. The '931 Patent is entitled "Step time change compensation in an industrial automation network." Charles M. Rischar, Kendal R. Harris, and Mark Chaffee are identified on the face of the '931 Patent as the inventors. On November 4, 2008, the USPTO duly and legally issued the '931 Patent from Application No. 11/279,320, filed on April 11, 2006. A true and correct copy of the '931 Patent is attached as Exhibit F. Netflix is the current owner by assignment of all rights, title, and interest in and under the '931 Patent, including the right to sue and obtain damages for past, current, and future infringement. Netflix has standing to sue for infringement of the '931 Patent.

22. The '751 Patent is entitled "Step time change compensation in an industrial automation network." Charles M. Rischar, Kendal R. Harris, and Mark Chaffee are identified on the face of the '751 Patent as the inventors. On February 2, 2010, the USPTO duly and legally issued

the '751 Patent from Application No. 12/237,425, filed on September 25, 2008. A true and correct copy of the '751 Patent is attached as Exhibit G. Netflix is the current owner by assignment of all rights, title, and interest in and under the '751 Patent, including the right to sue and obtain damages for past, current, and future infringement. Netflix has standing to sue for infringement of the '751 Patent.

The '472 Patent

23. The '472 Patent is generally directed to improvements to virtual machine technology and to an improved method of implementing network services across a server network (for example, partitions implementing databases).[6] As the '472 Patent explains, "a real time charging and policy control system for a communication service provider may have an access layer, a business and database layer, and a management layer," and "certain services may have higher service availability requirements than other services."[7] For example, "the access layer and business and database layer may have higher service availability requirements than the management layer."[8]

24. Then-existing systems met "service availability requirements" through service redundancy: "For example, an in-memory database executed on a server cluster may be implemented using a plurality of partitions. Redundancy may be achieved by having each partition duplicated at least once on a different server through synchronous replication."[9] However, as the '472 Patent explains, "[s]uch synchronous replication may affect both performance and cost efficiency."[10] Then-existing approaches attempted to mitigate these performance and cost efficiency issues through redundancy "limited to one active duplicated standby service, such as one duplicated partition per partition."[11] As the '472 Patent notes, however, "[i]n this scenario, if a server fails, the service operates without a redundant copy during the server's downtime," and "[i]f a second server

[6] *See* '472 Patent, 1:62-2:8.
[7] *Id.*, 1:37-42.
[8] *Id.*, 1:42-44.
[9] *Id.*, 1:44-50.
[10] *Id.*, 1:50-51.
[11] *Id.*, 1:52-54.

fails during the first server's downtime, the service will be unavailable."[12] Then-existing approaches thus resulted in a "risky period of lower service availability, where a second server failure would interrupt the service," which is "undesirable" particularly for "real-time or critical services."[13]

25. The innovation of the '472 Patent and its claimed methods avoid the significant reliability issues and cost inefficiencies in the prior art.[14] The '472 Patent describes executing services in a server network on virtual machines in a server cluster and instantiating the service as a virtual machine image stored on a hardware server.[15] For example, a service availability controller monitors or polls services executing on different virtual machines on the different servers in the network to determine when and which services to instantiate on which virtual machine.[16] In this way, the '472 Patent enhances overall service availability without additional hardware costs while limiting required redundancy and increasing cost efficiency in resource usage and allocation of a server network, thereby improving the performance of virtual machine systems.[17] The '472 Patent therefore addresses a specific technical problem, existing in then-existing methods, of ensuring service availability while limiting unnecessary redundancy.[18]

26. The '472 Patent claims specific, novel techniques for solving these technical problems and improving the virtual machine systems themselves. For example, Claim 6 recites:[19]

> A method comprising:
>
> monitoring a first availability of a first service, the first service having a first availability requirement and a first availability tolerance;
>
> detecting a reduction in the first availability of the first

[12] *Id.*, 1:54-57.

[13] *Id.*, 1:57-61.

[14] *Id.*, 1:62-63; *see also id.*, 9:31-10:11.

[15] *Id.*, 1:62-65.

[16] *Id.*, 2:58-63.

[17] *Id.*, 1:65-2:8.

[18] *Id.*, 1:44-51.

[19] The claims mentioned in this section are merely exemplary and not representative of all the claims of the '472 Patent.

service;

creating capacity for the first service by deactivating a second service on a first active virtual machine on a server, the second service having a second availability exceeding a second availability tolerance and having a second availability requirement lower than the first availability requirement; and

activating a second active virtual machine executing the first service on the server.[20]

27. In one aspect, the patent explains that the service availability controller determines when and which service(s) to instantiate on which virtual machine(s) by analyzing the availability requirements and availability tolerances of each of the services.[21] As recited, the claimed solution involves monitoring a particular virtual service and detecting a reduction in service availability. The recited solution further advantageously identifies a second service for deactivation. A service will only be identified for activation if it meets the specific claimed availability parameters. The claimed solution deactivates the second service and reallocates the resources used by the second service, thereby avoiding an interruption of the first service.[22] Claim 6 therefore recites an ordered combination of features that provide a particular, concrete technical improvement to a technical problem relating to enhancing overall service availability in virtual machine environments without additional hardware costs. Specifically, and for example, the claimed method provides technical improvements over then-existing approaches by reducing and/or eliminating the need for redundant servers to maintain high availability of a virtual service by identifying and dynamically responding to a reduction in availability of the virtual service, which was not well-known, routine, or conventional.[23]

28. The asserted dependent claims of the ’472 Patent recite additional and specific methods for implementing network services across a server network and thus provide improvements

[20] *Id.*, 9:32-45.

[21] *Id.* 4:35-44.

[22] *Id.*, 3:40-44 & 4:35-44.

[23] *Id.*, 1:44-2:8.

to virtual service architectures.

29. For example, Claim 7 of the '472 Patent recites "selecting the server according to a priority assignment of all active services on the server."[24] As the '472 Patent explains, for example, the claimed invention "may use lower priority servers 101, 102 to increase redundancy of higher priority services," which improves reliability over then-existing approaches "without increased hardware cost."[25] Thus, Claim 7 recites additional limitations that result in improved reliability and decreased costs, which are technical improvements to then-existing virtual machine technology and were not well-known, routine, or conventional.[26]

30. As another example, Claim 8 of the '472 Patent recites "deactivating a plurality of services on the server, the second service being one of the plurality, and the services of the plurality having respective service availabilities exceeding respective service availability tolerances and respective services availability requirements lower than the first service availability requirement."[27] As the '472 Patent explains:[28]

> "Resources may be diverted from lower priority services to higher priority services *to improve service availability of the higher priority services during server downtime*. When service availability of a higher priority service is reduced, an instance of a lower priority service is deactivated to provide an available server. The higher priority service is then activated on the available server. *Accordingly, higher priority service's period of reduced availability is reduced, and system reliability is improved without increased hardware costs or performance impact.*"

Thus, Claim 8 recites additional limitations that result in improved reliability and performance without increasing costs, which are technical improvements to then-existing virtual machine technology that were not well-known, routine, or conventional.

31. Additionally, Claim 9 of the '472 Patent recites additional specific methods for the "deactivating a plurality of services on the server" limitation in Claim 8 by "shutting down the

[24] *Id.*, 9:45-47.

[25] *Id.*, 3:42-44.

[26] *Id.*; *see also id.*, 1:44-2:8.

[27] *Id.*, 9:48-10:3.

[28] *Id.*, 1:65-2:8 (emphases added).

corresponding plurality of active virtual machines after deactivating the plurality of services."[29] Thus, Claim 9 recites additional limitations that result in technical improvements over then-existing approaches by further conserving resources associated with the active virtual machines once services have been deactivated and, when recited in the ordered combination, were not well-known, routine, or conventional.[30]

32. The above examples and patent disclosures demonstrate that the claimed invention is not abstract and is directed to improvements in the technology itself.

33. Pursuant to 35 U.S.C. § 282, the '472 Patent is presumed valid and patent eligible.

The '102 Patent

34. The '102 Patent is generally directed to improvements in subnetwork (or "subnet") management and provisioning within network infrastructures and to an improved method for provisioning subnets.[31] Before the '102 Patent, subnet management and provisioning tools managed only the IP address space and lacked the ability to manage inter-related characteristics of the IP address space, such as performance and security characteristics.[32] Prior art methods required the network manager to determine the IP address and network mask of an available subnet that met a network consumer's requirements.[33] Further, then-existing tools were separate and apart from the provisioning system itself.[34] This separation hindered resource allocation and made it difficult to adapt to fluctuating network demands, leading to potential delays and increased error rates.[35] The innovations of the '102 Patent address the problems of subnet management disclosed in the prior art. For example, the patent describes provisioning subnets by grouping the subnets based on their logical properties, such as security characteristics and performance characteristics, route information, or subnet usage metering.[36] The patent also describes a graphical user interface (GUI)

[29] *Id.*, 10:4-8.

[30] *Id.*, 5:35-43; *see also id.*, 1:44-2:8.

[31] *See* '102 Patent, 1:55-2:13; *see also* '102 Patent, 9:13-29.

[32] *Id.*, 1:29-48.

[33] *Id.*

[34] *Id.*

[35] *Id.*

[36] *Id.*, 3:35-47.

that allows a network consumer to make constrained selections of a particular subnet.[37] The '102 Patent therefore addresses a specific technical problem (subnet management and provisioning), which existed due to then-existing methods.

35. The '102 Patent claims specific, novel techniques for solving these technical problems and improving the technological systems and methods themselves. For example, Claim 1 of the '102 Patent recites:[38]

> A method for provisioning subnets, the method comprising:
>
> grouping the subnets into subnet groups based on logical properties of the subnets;
>
> assigning to each network consumer those subnet groups that are accessible to that network consumer; and
>
> providing for constrained selection of a particular subnet by a network consumer accomplished by way of a graphical user interface with selectable fields, wherein the constrained selection includes (i) selecting a public or private type address space, (ii) if applicable, selecting a gateway device from amongst those gateway devices that are accessible to the network consumer, and (iii) selecting a subnet group from those subnet groups that are accessible to the network consumer, and (iv) selecting a subnet mask that represents a size of the particular subnet.

36. During prosecution of the '102 Patent, in the Notice of Allowability dated October 17, 2007, the Examiner explained that the prior art failed to teach or render obvious "a method for provisioning subnets comprising all the limitations including 'providing for constrained selection of a particular subnet by a network consumer . . . wherein the constrained selection includes . . . (iv) selecting a subnet mask that represents a size of the particular subnet.'" The prosecution history confirms that at least the "providing for constrained selection" limitations were improvements to

[37] *Id.*, 1:55-61.

[38] The claims mentioned in this section are merely exemplary and not representative of all the claims of the '102 Patent.

then-existing methods.

37. In one aspect, the patent explains that logical properties for grouping may include security characteristics and performance characteristics, route information, subnet usage metering, IP address space information, the availability of a dynamics host configuration protocol (DHCP), the availability of multicasting support, and/or resilience to failures.[39]

38. Specifically, and for example, the claimed method provides technical improvements over then-existing approaches by logically grouping subnets and limiting subnets assigned to a consumer, and providing a constrained selection of subnets by advantageously implementing a GUI with certain selectable fields, that constrain the potential subnet provisioning based advantageously on (i) whether a public or private type address space is needed, (ii) ensuring any applicable gateway devices are accessible by the network consumer, (iii) ensuring the constrained group of subnet groups are all accessible by the network consumer, and further ensuring the subnet mask reflects the size of the particular constrained subnets, thereby improving subnet management and provision. Claim 1 therefore recites a combination of features that provide particular, concrete technical improvements to a technical problem relating to the accuracy and reliability of subnet provisioning in a network environment and were not well-know, routine, or conventional. Specifically, and for example, by dynamically constraining the selection of subnets to eliminate user error and improve the subnet provisioning process, the subnet provisioning in turn improves the network, for example, by confining data traffic to smaller sections of the network, improving routing of data, containing potential security breaches, and reducing wastage of IP addresses.[40]

39. The asserted dependent claims of the ’102 Patent recite additional and specific methods for provisioning subnets that provide further technical improvements to subnet management and provisioning within network infrastructures.

40. For example, Claim 3 of the ’102 Patent recites a specific method for the “constrained selection” limitation of Claim 1, involving “presenting IP addresses for those subnets from the selected subnet group that are available for use and that conform to the selected subnet

[39] *Id.*, 3:35-47.

[40] *Id.*, 1:29-2:13.

mask, the selected type of address space, and the selected gateway device, if any."[41] As the '102 Patent explains, to facilitate selection of a specific subnet, "the system dynamically generates and presents those subnets which conform to the following criteria: i) the subnets were configured into the selected subnet group by the network manager; ii) the subnets have the selected subnet mask; iii) the subnets have the selected public or private type of address space; and iv) traffic is routable to the subnet via the selected gateway device, if any."[42] This improves performance, improves security, and reduces errors compared to then-existing systems by presenting IP addresses for those subnets that conform with the criteria recited above in Claim 3 of the '102 Patent, which, when recited in the ordered combination, was not well-known, routine, or conventional.[43]

41. As an additional example, Claim 4 of the '102 Patent recites the additional and specific method, "wherein those subnet groups that are accessible to each network consumer is constrained by a workgroup type of that network consumer."[44] As the '102 Patent explains, "workgroup types" include, for example, human resources, finance, administration, and engineering.[45] This improves performance and network security over then-existing approaches by constraining the subnet groups accessible to each network consumer based on workgroup type, which, when recited in the ordered combination, was not well-known, routine, or conventional.[46]

42. Additionally, Claim 11 of the '102 Patent recites the additional and specific method for the "grouping" limitation of Claim 1, "wherein the logical properties include support of multicasting in a subnet group."[47] As a person of ordinary skill in the art would have understood, multicasting is a network communication method where a single data transmission is sent to a group of recipients simultaneously, rather than individually to each receiver. Thus, Claim 11 recites further performance improvements over then-existing systems by grouping subnets based on whether the

[41] *Id.*, 9:33-39.
[42] *Id.*, 9:52-59.
[43] *Id.*, 1:29-2:13.
[44] *Id.*, 9:40-42.
[45] *Id.*, 3:48-56
[46] *Id.*, 1:29-2:13.
[47] *Id.*, 10:1-2.

subnets support multicasting, which, when recited in the ordered combination, was not well-known, routine, or conventional.[48]

43. The above examples and the patent disclosures demonstrate that the claimed invention is not abstract and is directed to improvements in subnet management and provisioning.

44. Pursuant to 35 U.S.C. § 282, the '102 Patent is presumed valid and patent eligible.

The '912 Patent

45. The '912 Patent is generally directed to improvements in the synchronization of node clocks within a network of nodes, specifically enhancing the precision and performance of time synchronization in networked systems using the IEEE 1588 standard.[49]

46. The first version of the IEEE 1588 standard was published in 2002 and established a basic framework for the Precision Time Protocol (PTP). However, the IEEE 1588-2002 standard was sensitive to network delays, making it difficult to maintain precise synchronization in networks. The '912 Patent specifically addresses a particular technical problem with then-existing methods, including issues such as network collisions, limited data throughput, and non-deterministic data delivery.[50]

47. As the '912 Patent explains, "there is a class of distributed motion control applications that require both precision time synchronization and deterministic data delivery."[51] Deterministic data delivery means "input data will be received and output data will be transmitted at specific time points based on predetermined periodic intervals. This requires coordination of network bandwidth with resources at the intermediate and end nodes."[52] The '912 Patent details the challenges of achieving these goals in modern ethernet networks, such as limitations of physical copper cables carrying the signals, throughput limitations, and the delays inherent in network switches which use "store and forward" architectures.[53] Distributed applications, such as motion

[48] *Id.*, 1:29-2:13.
[49] *See* '912 Patent, 2:34-47.
[50] *Id.*, 1:25-2:30.
[51] *Id.*, 1:25-47.
[52] *Id.*, 1:25-47.
[53] *Id.*, 1:25-2:30.

control and robotics, require sub-microsecond level precision which is difficult to achieve when network data needs to travel through multiple network switches.[54] Further, in the aforementioned "store and forward architecture, significant random cumulative delays are introduced in the data delivery path resulting in non-deterministic data delivery and other performance issues."[55] Thus, the '912 Patent provides, for example, "time synchronization of the daisy-chain connected network nodes," "deterministic data delivery," and "a redundant data path in the event of a network failure."[56]

48. The '912 Patent claims specific, novel techniques for improving the synchronization of clocks in networked nodes by addressing delays through timestamp adjustments, prioritizing time synchronization frames for transmission, and ensuring reliable data delivery paths, particularly in industrial control and motion control applications using full duplex Ethernet networks.[57] For example, Claim 1 recites:[58]

> A method of synchronizing node clocks within a plurality of nodes on a network including a time master node having a master clock and including at least one time slave node, the method comprising:
>
> connecting the plurality of nodes through a full duplex Ethernet network with a daisy-chain connection of the nodes to each other;
>
> transmitting a time synchronization message frame from one of the plurality of nodes to a second one of said plurality of nodes, the time synchronization message frame having a timestamp field according to IEEE 1588 standard and a checksum field and a cyclic redundancy checking code;

[54] *Id.*, 1:48-2:18.

[55] *Id.*, 2:19-25.

[56] *Id.*, 2:26-30.

[57] *Id.*, 2:34-3:29.

[58] The claims mentioned in this section are merely exemplary and not representative of all the claims of the '912 Patent.

at a given one of the plurality of nodes between the first and second nodes:

(i) receiving the time synchronization message frame;

(ii) reading a timestamp value of a timestamp field of the time synchronization message frame;

(iii) near a time of retransmission of the time synchronization message frame from the given node, adjusting the read timestamp value in the timestamp field by an amount of delay between time of reception and a time of the retransmission to produce a corrected timestamp value;

(iv) writing the corrected timestamp value over the timestamp value of the timestamp field of the time synchronization message frame;

(v) adjusting a checksum value in the checksum field and adjusting the cyclic redundancy checking code of the time synchronization message frame to account for adjusting the timestamp value; and

(vi) transmitting the time synchronization message frame from the given node; and

providing a highest priority to process and forward time synchronization message frames and lower priorities to process and forward other types of message frames.[59]

49. As recited with respect to one aspect, the claimed method provides technical improvements over then-existing approaches by providing a specific, novel technique for adjusting a timestamp to produce a corrected timestamp value, writing that corrected value over a current value, with this correct value, adjusting a checksum value and cyclic redundancy checking ("CRC") code of the sync message frame to account for adjusted timestamp value, and, at the intermediary

[59] *Id.*, 9:44-10:12.

node, prioritize processing and forwarding of this corrected sync message frame, thereby improving the performance of synchronization of node clocks within a network of nodes.

50. Claim 1 therefore recites a combination of features that provide particular, concrete technical improvements to a technical problem relating to the reducing latency and collisions in a network. Specifically, and for example, allowing for improved communication between nodes in a network by improving clock synchronization through dynamic adjustments to a timestamp value and by prioritizing time synchronization frames for transmission which was not well-known, routine, or conventional.[60]

51. The ’912 Patent includes an additional asserted independent claim, Claims 7. Each independent claim recites unique limitations not found in the others. Additionally, the dependent claims of the ’912 Patent, including for example Claims 2, 3, 5, 6, 8-12, recite additional and specific systems and methods for synchronizing node clocks within a plurality of nodes on a network, thus providing improvements to computer networks and distributed applications that operate on these networks.

52. For example, independent Claim 7 recites “forming the network in a ring including the first data path and the second data path from the supervisory node,” which addresses a specific network architecture, and “the plurality of nodes measuring and saving path delay data relative to master clock through the first data path and the second data path and through the first port and the second port on the supervisory node,” which addresses not only the amount of delay, but the network path where the delay occurred. Thus, Claim 7 recites limitations that result in technical improvements over then-existing approaches by reciting additional limitations, beyond those discussed above with respect to Claim 1, concerning specific network architecture with which the claimed method is applied and which were not well-known, routine, or conventional.[61]

53. As noted above, the asserted dependent claims of the ’912 Patent recite additional and specific methods for improving synchronization of clocks in networked nodes.

54. For example, Claim 2 of the ’912 Patent recites “wherein the plurality of nodes are

[60] *Id.*, 1:24-2:30.

[61] *Id.*, 1:24-2:30.

at least one of: an industrial controller, a network bridge, a motion control device, a discrete or process I/O device or a human-machine interface."[62] As the '912 Patent explains, "[o]ne object of the invention is to provide time synchronization of the daisy-chain connected network nodes."[63] Thus, Claim 2 recites additional limitations that result in technical improvements over then-existing approaches by reciting an additional limitation concerning specific hardware with which the claimed method is applied and which was not well-known, routine, or conventional.[64]

55. As another example, Claim 3 of the '912 Patent recites "wherein the plurality of nodes are connected through two ports on each node and wherein at least one of the plurality of nodes provides a third port connecting to additional nodes on a full duplex Ethernet branch from a main portion of the network."[65] The '912 Patent explains that "[t]he third daisy chain port 21 can be used to start a new daisy chain . . . ."[66] In particular, it explains that "FIG. 4c illustrates a complex daisy chain network made possible by the third daisy chain port 21 in the switch 12a."[67]

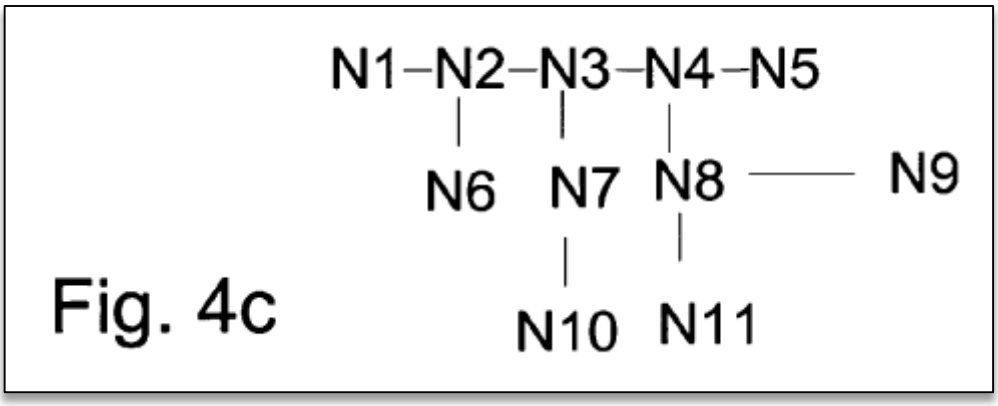

Figure 1. Figure 4c from the '912 Patent.

56. Thus, Claim 3 recites additional limitations that result in technical improvements over then-existing approaches by extending the claimed methods to "complex daisy chain network(s)" and which were not well-known, routine, or conventional.[68]

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[62] *Id.*, Claim 2.
[63] *Id.*, 2:26-27.
[64] *See id.*, 3:63-66.
[65] *Id.*, Claim 3.
[66] *Id.*, 4:20-21.
[67] *Id.*, 4:33-35.
[68] *Id.*, 4:27-39.

57. Claim 12 of the '912 Patent recites "wherein the plurality of nodes restore the normal mode of operation at a predetermined time by switching back to measure time delay associated with the first data path and at a same time the supervisory node changes to normal mode of operation thereby converting the network back to a ring topology."[69] The '912 Patent explains:

> In a further aspect of the invention, redundancy is provided by extending the daisy chain to a ring topology. In this case, a designated supervisory device will have one master clock with two specialized ports and a specialized signaling protocol for providing redundancy. The end nodes will measure and save delay times of two paths of ring topology through two ports of the master node. During normal operation, the supervisory device will break endless circulation of packets from the second port to the first port and vice versa, and will simultaneously monitor traffic by sending special packets on the first port and tracking them on the second port. Simultaneously, the supervisory device and end nodes will monitor link status of their ports periodically and the end nodes will notify the supervisory device in case of failure of a port through other port. When the supervisory device detects or is notified of a network failure, it will broadcast this status to all nodes through two different messages on its two ports. Furthermore, it will forward all packets from one port to other, effectively converting the network to bus topology. On receiving the broadcast, those end nodes that received the message from second port on supervisory device will switch to measured and saved delay of second path through second port of master clock. Those end nodes that received broadcast from the first port on supervisory device will take note of situation and will continue using measured delay through first path. By switching the time delay, time synchronization will continue to function correctly. By switching to bus topology, data delivery will continue to function correctly. Since the end nodes can tolerate short-term loss of synchronization messages and control data from network failure to topology transition, the system will function continuously. Through additional messages the supervisory device can pinpoint failure and signal an operator for network maintenance. After the operator notifies about completion of maintenance, the system will go through a reverse process to return to normal mode of operation.[70]

58. Thus, Claim 12 recites additional limitations that result in technical improvements over then-existing approaches by providing a novel architecture and technique for providing redundancy in networked nodes and which were not well-known, routine, or conventional.

59. During prosecution of the '912 Patent, the USPTO confirmed the '912 Patent novelty

[69] *Id.*, Claim 12.

[70] *Id.*, 2:61-3:29.

and inventiveness while issuing its Notice of Allowance, stating that for independent claims 1 and 14, "the prior art of record fails to anticipate or render obvious '(iii) near a time of retransmission of the time synchronization message frame from the given node, adjusting the read timestamp value in the timestamp field by an amount of delay between time of reception and a time of the retransmission to produce a corrected timestamp value; (iv) writing the corrected timestamp value over the timestamp value of the timestamp field of the time synchronization message frame.' in combination with the other limitations of the claims."[71] The prosecution history confirms that at least the above-referenced limitations were improvements to then-existing methods.

60. The '912 Patent further elaborates on specific embodiments for the claimed method. For example, the '912 Patent explains:

> When a timestamp point according to IEEE 1588 standard is reached during transmission, a timestamp trigger is sent to associated timestamp register 32-39 to capture transmit timestamp (Txts) from delay time counter 31, as represented by process block 79. Next, *the switching delay experienced by the frame inside switch is calculated by subtracting a saved receive timestamp (Rxts) from a transmit timestamp (Txts), as represented by process block 80*. Next, as represented by process block 81, *the UDP checksum for the time synchronization message is recomputed from the saved UDP checksum, for the added switching delay to origin timestamp at block 82 and inserted at appropriate location in frame*. Next, as represented by process block 82, *the switching delay is added to the saved origin timestamp and is inserted at the appropriate location in frame*. Then, the CRC error checking code for the entire frame is computed and inserted at the end of frame, as represented by process block 83. The frame transmission is completed, followed by inter-frame gap according IEEE 802.3 standard and the transmit channel is ready for transmission as represented by process block 75.[72]

61. In other words, a network switch may capture and adjust timestamps of transmitted time synchronization message frames to account for internal switching delays, thereby ensuring precise clock synchronization.

62. The above examples and the patent disclosures demonstrate that the claimed invention is not abstract and is directed to improvements in the synchronization of node clocks within a network of nodes.

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[71] '912 Patent Prosecution History, September 8, 2009, Notice of Allowance at 2 (emphases added).

[72] *Id.*, 7:34-54.

63. Pursuant to 35 U.S.C. § 282, the '912 Patent is presumed valid and patent eligible.

The '931 Patent

64. The '931 Patent is generally directed to improvements in "time synchronization technology and more particularly to compensation for system step changes across a network of distributed devices in order to accurately represent time."[73] The '931 Patent is specifically directed at improving the precision and performance of time synchronization in networked systems using the IEEE 1588 protocol.[74] For example, the '931 Patent explained of then-available protocols:

> Today's time synchronization protocols, including the IEEE 1588, are not without deficiencies with respect to step changes in time. In particular, those protocols do not account for step changes in the master clock, (e.g., the clock is changed manually, the clock loses the time reference satellite for a given time period, etc.). Any step change seen by the master clock will also be seen by the associated slave clocks and *this makes it difficult for the system to perform certain control functions*. For example, a step change taking place between two events, which occurred at the same instant in time, could be seen by two independent clocks as occurring at two different times. In yet another example, if step change occurred between two occurrences of the same event it would be difficult to calculate the interval between the two events.[75]

65. These deficiencies (collectively referred to herein as the "step change problem") with then-existing methods could lead to consequences for many time-sensitive applications. For example, the '931 Patent notes that issue could arise in applications "where regulatory requirements dictate that process steps be timed (e.g., heating, mixing, compression time, time involved in adding ingredients, etc.)."[76] One specific issue with respect to the step change problem identified by the '931 Patent is that "[s]tep changes in a master clock [could] result in [manufacturers] having to discard otherwise high-quality product if those step changes that occurred can not be determined accurately."[77] Clock synchronization is similarly critical to applications like data centers.[78]

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[73] '931 Patent, 1:14-17.

[74] *See id.*, Abstract.

[75] *Id.*, 2:10-21 (emphasis added).

[76] *Id.*, 2:40-44.

[77] *Id.*, 2:44-47.

[78] *See e.g.*, In-Sync: The Crucial Role of Timing in Data Centers, Data center Knowledge, https://www.datacenterknowledge.com/networking/in-sync-the-crucial-role-of-timing-in-data-

66. Referring to the step change problem, the '931 Patent identifies the "*need to overcome . . . deficiencies associated with conventional systems and devices and time synchronization.*"[79] To do so, the '931 Patent discloses novel, technical solutions. For example, the '931 Patent describes using a "time synchronization component" in conjunction with a "time sync component" to determine if a step change has occurred:

> In accordance with another embodiment of the innovation described herein, *the time synchronization component can work in conjunction with a CIP and can employ a timestamp component and a time sync component to determine if a step change has occurred in the system. The time synchronization component can verify that a step change has occurred in the system and can correct for those step changes across the time devices in the system.* The time synchronization component can direct a timestamp component to store timestamps and offsets for the various clock nodes in a database. The clocks within the system can be synchronized to a specified uncertainty, so that measurements of any time interval between the clocks are not greater than the specified uncertainties.[80]

67. As described above, "[t]he timestamp component 104 and the time sync component 106 can facilitate identifying step changes that have occurred to the overall system time and reconfigure the times of clocks connected to a CIP network 110," thereby improving time synchronization technology.[81] As discussed further below, then-existing solutions failed to take master clock step changes into account.

68. As another example, the '931 Patent further describes a "time stamp component" that interacts with the above described "time sync component" to perform the claimed solution:

> Now turning to the figures, FIG. 1 illustrates a time synchronization system 100 that can compensate for step changes in system time. The system 100 can be employed in a motion control system, such as, for example, a manufacturing motion control system within an industrial, automotive, aerospace environment, etc. *The time synchronization system 100 can include a time synchronization component 102 that*

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centers (last accessed May 21, 2025) ("Servers in data centers are communicating with each other millions of times per second, processing critical transactions that must be precisely timed. Computers have internal clocks to keep track of timing, but these clocks are constantly drifting in relation to each other. If mechanisms aren't put in place to continuously synchronize the internal clocks, there is an increased likelihood of data corruption or loss due to these discrepancies.").

[79] '931 Patent, 3:1-3 (emphasis added).

[80] *Id.*, 3:29-41 (emphasis added).

[81] *Id.*, 6:19-22.

> *includes a timestamp component 104 that interacts with a time sync component 106. The timestamp component 104 can be configured to record timestamps and offsets captured from at least one network node (e.g., one or more source nodes and/or one or more destination nodes). The time synch component 106 can be configured to identify step changes to at least one master clock and synchronize a local clock time of the network node with the identified step change. Each node maintains a local time independent from other nodes, however, all notes maintain a common understanding of system time.* Thus, local clocks can be adjusted to a system time based on the step changes identified by time sync component 106.[82]

69. The '931 Patent thus describes additional, specific details for implementing its disclosed solutions.

70. Indeed, the '931 Patent provides multiple practical examples embodying its solution. As one example, Figure 7 of the '931 Patent "is an exemplary system 700 employing the one or more embodiments disclosed herein in an industrial automation environment."[83]

[82] *Id.*, 5:52-6:4 (emphasis added).

[83] *Id.*, 13:15-17.

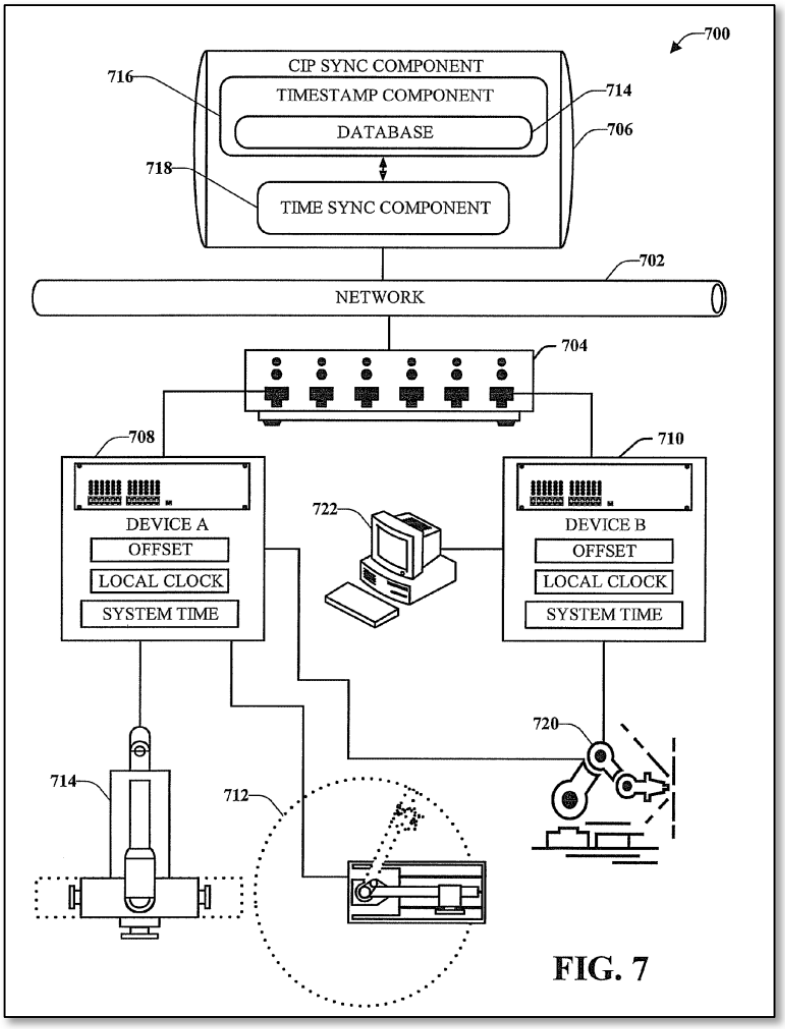

Figure 2. Figure 7 from the '931 Patent.

71. As described by the '931 Patent, "[s]ystem 700 can [] include a switch 704 acting as a grandmaster clock such as a programmable logic controller (PLC) or other control system, for example. The switch 704 interacts with a time synchronization component 706 and can also interact with a plurality of clocks, e.g., device A 708 and device B 710. Device A 708 can communicate and provide system time for automation devices including a drilling machine 712, vertical mill 714 and a robotic welding cell 720 containing multiple robots."[84]

72. The independent claims of the '931 Patent reflect these disclosed technical solutions for improving time synchronization technology. For example, Claims 27 recites:[85]

27. A method for enabling node timestamp time

[84] *Id.*, 13: 25-34.

[85] The claims mentioned in this section are merely exemplary and not representative of all the claims of the '931 Patent.

synchronization with a master clock step change employing timestamps received at a single node, comprising:

receiving a first timestamp associated with a first offset and a second timestamp associated with a second offset;

calculating a compensated timestamp based in part of the first timestamp and associated offset and the second offset;

determining if a step change has occurred; and

selectively updating the second timestamp and associated second offset if a step change has occurred.[86]

73. As shown in exemplary Claim 27 above, the claimed method provides technical improvements over then-existing approaches by at least "determining if a step change has occurred; and selectively updating the second timestamp and associated second offset if a step change has occurred," which was not well-known, routine, or conventional. These limitations were specifically identified by the USPTO as a providing novel solution to the step change problem. For example, during prosecution the examiner stated that "none of the prior art of record, particularly the applied art, discloses or teaches the recited group startup sequence; nor calculating a compensated timestamp, determining if a step change has occurred, and updating if a step change has occurred; nor receiving the source offset and comparing it to a previous offset to determine a step change, and selectively adjusting the timestamp and offset based on the step change; in combination with the rest of the subject matter of the respective claim, respective independent claim and any intervening claims."[87] Additionally, while issuing its Notice of Allowance, the examiner stated that "none of the prior art of record, particularly the applied art, discloses or teaches a time [synch] component that identifies step changes to at least one master clock based in part on calculating a compensated timestamp, in combination with the rest of the subject matter of the respective independent claim."[88] The prosecution history confirms that at least the above-referenced limitations were improvements

[86] *Id.*, 22:14-24.

[87] '931 Patent Prosecution History, September 25, 2007, Non-Final Rejection at 3 (emphases added).

[88] '931 Patent Prosecution History, June 27, 2008, Notice of Allowance at 2 (emphases added).

to then-existing methods.

74. Claim 27 therefore recites a combination of features that provide particular, concrete technical improvements to a technical problem relating to time synchronization technology. Specifically, and for example, identifying a step change in a master clock and selectively updating timestamps if a step change is detected, which was not well-known, routine, or conventional.[89]

75. The asserted dependent claims of the '931 Patent recite additional and specific methods for improving time synchronization technology. For example, Claim 28 recites "determining if a step change has occurred" by "comparing the second offset to the first offset" and "determining a difference between the first offset and the second offset."[90] "[A] time synchronization offset clock model can be a network of devices that share the same concept of a system time and each of the devices can also have a local clock value based on frequency disciplined timing and related to system time by a system offset value."[91] The '931 Patent explains "the source offset can be sent to the destination node along with the timestamp and the destination device compares the offset received to the previously received offset to determine if a step change has occurred."[92] This describes an additional, specific technique for determining if a step change has occurred which, as discussed above, is critical to the '931 Patent's overall technical solution to the step change problem, thereby improving the performance of time synchronization technology. Thus, Claim 28 recites additional limitations that result in technical improvements over then-existing approaches by reciting a specific technique which was not well-known, routine, or conventional.[93]

76. The above examples and the patent disclosures demonstrate that the claimed invention is not abstract and is directed to improvements in time synchronization technology.

77. Pursuant to 35 U.S.C. § 282, the '931 Patent is presumed valid and patent eligible.

The '751 Patent

78. The '751 Patent, which shares a common specification with the '931 Patent, is

[89] *Id.*, 1:21-3:3.

[90] *Id.*, Claim 28.

[91] *Id.*, 3:43-47.

[92] *Id.*, 16:39-43.

[93] *See id.*, 3:63-66.

generally directed to improvements in "time synchronization technology and more particularly to compensation for system step changes across a network of distributed devices in order to accurately represent time."[94] The '751 is specifically directed at improving the precision and performance of time synchronization in networked systems using the IEEE 1588 protocol.[95] For example, the '751 Patent explained of then-available protocols:

> Today's time synchronization protocols, including the IEEE 1588, are not without deficiencies with respect to step changes in time. In particular, those protocols do not account for step changes in the master clock, (e.g., the clock is changed manually, the clock loses the time reference satellite for a given time period, etc.). Any step change seen by the master clock will also be seen by the associated slave clocks and *this makes it difficult for the system to perform certain control functions*. For example, a step change taking place between two events, which occurred at the same instant in time, could be seen by two independent clocks as occurring at two different times. In yet another example, if step change occurred between two occurrences of the same event it would be difficult to calculate the interval between the two events.[96]

79. These deficiencies (collectively, as above, referred to herein as the "step change problem") with then-existing systems could lead to consequences for many time-sensitive applications. For example, the '751 Patent notes that issue could arise in applications "where regulatory requirements dictate that process steps be timed (e.g., heating, mixing, compression time, time involved in adding ingredients, etc.)."[97] One specific issue with respect to the step change problem identified by the '751 Patent is that "[s]tep changes in a master clock [could] result in [manufacturers] having to discard otherwise high-quality product if those step changes that occurred can not be determined accurately."[98] Clock synchronization is similarly critical to applications like data centers.[99]

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[94] '751 Patent, 1:19-22.

[95] *See id.*, Abstract.

[96] *Id.*, 2:15-29 (emphasis added).

[97] *Id.*, 2:47-49.

[98] *Id.*, 2:49-52.

[99] *See e.g.*, In-Sync: The Crucial Role of Timing in Data Centers, Data center Knowledge, https://www.datacenterknowledge.com/networking/in-sync-the-crucial-role-of-timing-in-data-centers (last accessed May 21, 2025) ("Servers in data centers are communicating with each other millions of times per second, processing critical transactions that must be precisely timed.

80. Referring to the step change problem, the '751 Patent identifies the "*need to overcome . . . deficiencies associated with conventional systems and devices and time synchronization.*"[100] To do so, the '751 Patent discloses novel, technical solutions. For example, the '751 Patent describes using a "time synchronization component" in conjunction with a "time sync component" to determine if a step change has occurred:

> In accordance with another embodiment of the innovation described herein, *the time synchronization component can work in conjunction with a CIP and can employ a timestamp component and a time sync component to determine if a step change has occurred in the system. The time synchronization component can verify that a step change has occurred in the system and can correct for those step changes across the time devices in the system.* The time synchronization component can direct a timestamp component to store timestamps and offsets for the various clock nodes in a database. The clocks within the system can be synchronized to a specified uncertainty, so that measurements of any time interval between the clocks are not greater than the specified uncertainties.[101]

81. As described above, "[t]he timestamp component 104 and the time sync component 106 can facilitate identifying step changes that have occurred to the overall system time and reconfigure the times of clocks connected to a CIP network 110," thereby improving time synchronization technology.[102] As discussed further below, then-existing solutions failed to take master clock step changes into account.

82. As another example, the '751 Patent further describes a "time stamp component" that interacts with the above described "time sync component" to perform the claimed solution:

> Now turning to the figures, FIG. 1 illustrates a time synchronization system 100 that can compensate for step changes in system time. The system 100 can be employed in a motion control system, such as, for example, a manufacturing motion control system within an industrial, automotive, aerospace environment, etc. *The time synchronization system 100 can include a time synchronization component 102 that includes a timestamp component 104 that interacts with a time sync component 106. The timestamp component 104 can be configured to*

Computers have internal clocks to keep track of timing, but these clocks are constantly drifting in relation to each other. If mechanisms aren't put in place to continuously synchronize the internal clocks, there is an increased likelihood of data corruption or loss due to these discrepancies.").

[100] '931 Patent, 3:6-8 (emphasis added).

[101] *Id.*, 3:34-46 (emphasis added).

[102] *Id.*, 6:24-27.

> *record timestamps and offsets captured from at least one network node (e.g., one or more source nodes and/or one or more destination nodes). The time synch component 106 can be configured to identify step changes to at least one master clock and synchronize a local clock time of the network node with the identified step change. Each node maintains a local time independent from other nodes, however, all notes maintain a common understanding of system time.* Thus, local clocks can be adjusted to a system time based on the step changes identified by time sync component 106.[103]

83. The '751 Patent thus describes additional, specific details for implementing its disclosed solutions.

84. Indeed, the '751 Patent provides multiple practical examples embodying its solution. As one example, Figure 7 of the '751 Patent "is an exemplary system 700 employing the one or more embodiments disclosed herein in an industrial automation environment."[104]

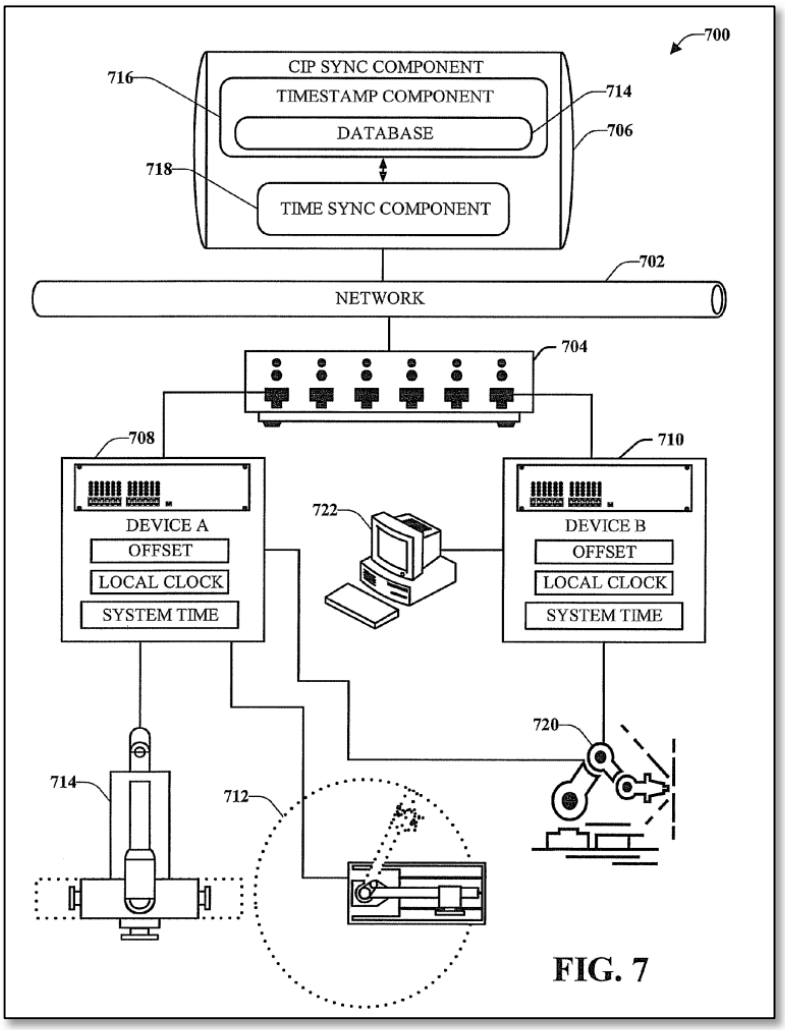

FIG. 7

[103] *Id.*, 5:57-6:9 (emphasis added).

[104] *Id.*, 13:14-16.

Figure 3. Figure 7 from the '751 Patent.

85. As described by the '751 Patent, "[s]ystem 700 can [] include a switch 704 acting as a grandmaster clock such as a programmable logic controller (PLC) or other control system, for example. The switch 704 interacts with a time synchronization component 706 and can also interact with a plurality of clocks, e.g., device A 708 and device B 710. Device A 708 can communicate and provide system time for automation devices including a drilling machine 712, vertical mill 714 and a robotic welding cell 720 containing multiple robots."[105]

86. The independent claims of the '751 Patent reflect these disclosed technical solutions for improving time synchronization technology. For example, Claim 1 recites:[106]

> A system that enables time synchronization, comprising:
>
> a timestamp component that captures timestamps and offsets from at least one network node; and
>
> a time synch component that identifies step changes to at least one master clock and synchronizes a local clock time of the at least one network node with the identified step change.[107]

87. As shown in exemplary Claim 1 above, the claimed system provides technical improvements over then-existing approaches by at least including "a time synch component that identifies step changes to at least one master clock and synchronizes a local clock time of the at least one network node with the identified step change," which was not well-known, routine, or conventional. These limitations were specifically identified by the USPTO as a providing novel solution to the step change problem. For example, during prosecution the examiner stated that "none of the prior art of record, particularly the applied art, discloses or teaches the recited group startup sequence; nor calculating a compensated timestamp, determining if a step change has occurred, and updating if a step change has occurred; nor receiving the source offset and comparing it to a previous offset to determine a step change, and selectively adjusting the timestamp and offset based on the

[105] *Id.*, 13: 24-29.

[106] The claims mentioned in this section are merely exemplary and not representative of all the claims of the '751 Patent.

[107] *Id.*, Claim 1.

step change; in combination with the rest of the subject matter of the respective claim, respective independent claim and any intervening claims."[108] Additionally, while issuing its Notice of Allowance, the examiner stated that "none of the prior art of record, particularly the applied art, discloses or teaches a identifies step changes to at least one master clock based in part on calculating a compensated timestamp, in combination with the rest of the subject matter of the respective independent claim."[109] The prosecution history confirms that at least the above-referenced limitations were improvements to then-existing methods.

88. Claim 1 therefore recites a combination of features that provide particular, concrete technical improvements to a technical problem relating to time synchronization technology. Specifically, and for example, identifying a step change in a master clock and selectively updating timestamps if a step change is detected, which was not well-known, routine, or conventional.[110]

89. The asserted dependent claims of the '751 Patent recite additional and specific systems for improving time synchronization technology. For example, Claim 5 recites that "each network node maintains a local time independent from other nodes and all nodes maintain a common understanding of system time"[111] and that the time synch component further determines whether to adjust local clocks to system time based on data from the timestamp component."[112] The '751 elaborates on the embodiment claimed:

> In accordance with another embodiment of the innovation described herein, a time synchronization offset clock model can be a network of devices that share the same concept of a system time and each of the devices can also have a local clock value based on frequency disciplined timing and related to system time by a system offset value. For example, the model can allow each device to maintain a local time independence from all of the other devices, but share a common notion of system time associated with a grandmaster clock and as such, system time can change without requiring changes to the local clocks (e.g., microprocessors, embedded controllers, programmable logic controllers (PLC)). The time synchronization offset clock model can define a mechanism to maintain a consistent set of timestamps in

[108] '751 Patent Prosecution History, July 8, 2009, Non-Final Rejection at 3-4.

[109] '751 Patent Prosecution History, September 22, 2009, Notice of Allowance at 2.

[110] *Id.*, 1:21-3:3.

[111] This limitation is part of Claim 4 from which Claim 5 depends.

[112] '751 Patent, Claim 5.

> the presence of step changes to the grandmaster clock and associated system time.[113]

90. Thus, Claim 5 recites additional limitations that result in technical improvements over then-existing approaches by reciting additional limitations directed to time synchronization architectures which were not well-known, routine, or conventional.[114]

91. The above examples and the patent disclosures demonstrate that the claimed invention is not abstract and is directed to improvements in time synchronization technology.

92. Pursuant to 35 U.S.C. § 282, the '751 Patent is presumed valid and patent eligible.

DEFENDANTS' INFRINGEMENT AND LIABILITY

93. The '472 and '102 Patents are infringed by virtualization products (defined below as the "Broadcom Load Balancing Accused Products" and "Broadcom Subnet Provisioning Accused Products", respectively), which Broadcom acquired from VMware in the Merger Agreement. When it merged with VMware, Broadcom told its investors that VMware "pioneered the concept of virtualization."[115] However, as explained herein, VMware did so by leveraging the technological innovations of others.

94. On information and belief, Broadcom stands in VMware's shoes and/or shares liability for all infringement of the '472 and '102 Patents, both before and after the Merger Agreement.

95. On information and belief, any and all liability for the infringement of the '472 and '102 Patents held by VMware shall also be deemed held by Broadcom as a result of the Merger Agreement.

96. For example, pursuant to the Merger Agreement, VMware, Inc.'s operations, knowledge, products, product marketing/instructions, and employees are now integrated with and/or attributable to Broadcom. Broadcom described the "anticipated synergies and economies of scale expected from the integration of the VMware business . . . includ[ing] cost savings, operating

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[113] *Id.*, 3:47-62.

[114] *Id.*, 1:25-3:8.

[115] Broadcom (AVGO) Q2 2022 Earnings Call Transcript, Motley Fool Transcribing, Fool.com (May 26, 2022), available at https://www.fool.com/earnings/call-transcripts/2022/06/02/broadcom-ltd-avgo-q2-2022-earnings-call-transcript/.

efficiencies and other strategic benefits projected to be achieved as a result of the VMware Merger."[116] Broadcom described the challenges of the VMware Merger as "integrating the VMware workforce," "integrating operations," "integrating corporate, information technology, finance and administrative infrastructures," and "integrating financial forecasting and controls, procedures and reporting cycles."[117] In its IRS filings, Broadcom refers to the Transaction as the "Broadcom/VMware Combination."[118] Accordingly, on information and belief, Broadcom and VMware are jointly and severally liable for infringement of all the '472 and '102 Patents, including past and future damages, as set forth in detail herein.

97. The '912, '931, and '751 Patents are infringed by Broadcom's ethernet switching products as defined further below (the "Broadcom Switching Accused Products"). For at least the statutory-defined damages period, Broadcom has made, used, offered to sell, and/or sold the Broadcom Switching Accused Products and continues to make, use, offer to sell, and sell the Broadcom Switching Accused Products.

98. Accordingly, on information and belief, Broadcom is liable for infringement of the '912 Patent, the '931 Patent, and the '751 Patent including past and future damages, as set forth in detail herein.

FIRST CLAIM FOR RELIEF

Infringement of U.S. Patent No. 10,331,472 (the "'472 Patent")

99. Netflix incorporates by reference all preceding paragraphs, *supra*.

100. Broadcom and VMware, jointly and severally, have infringed, and Broadcom and VMware continue to infringe, at least Claims 6-10 of the '472 Patent, either literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale within the United States and/or importing into the United States products that are covered by at least Claims 6-10 of the '472 Patent. These products include, but are not limited to, VMware Cloud Foundation, VMware

[116] Broadcom SEC Form 10-Q for quarter ending on August 4, 2024, available at https://investors.broadcom.com/static-files/b32ea83a-0ca4-4f37-bd83-715a82ad795a at 12.

[117] Broadcom SEC Form 10-K for fiscal year ending on October 29, 2023, available at https://investors.broadcom.com/static-files/2b98b262-4fbb-4731-b3dd-88f6ca187002 at 17-18.

[118] Broadcom SEC Form 8937 filed on December 21, 2023, available at https://investors.broadcom.com/static-files/7720c4c1-c940-4d9d-800c-66819bfdc7a0 at 2.

Cloud on AWS, Azure VMware Solution, Google Cloud VMware Engine, Oracle Cloud VMware Solution, IBM Cloud for VMware Solutions, Alibaba Cloud VMware Service, as well as any other products and/or services incorporating VMware NSX/NSX-T Data Center and/or VMware Avi Load Balancer (formerly VMware NSX Advanced Load Balancer)[119] (collectively, the "Broadcom Load Balancing Accused Products").

101. Claim 6 of the '472 Patent recites:

> A method comprising:
>
> monitoring a first availability of a first service, the first service having a first availability requirement and a first availability tolerance;
>
> detecting a reduction in the first availability of the first service;
>
> creating capacity for the first service by deactivating a second service on a first active virtual machine on a server, the second service having a second availability exceeding a second availability tolerance and having a second availability requirement lower than the first availability requirement; and
>
> activating a second active virtual machine executing the first service on the server.

102. The Broadcom Load Balancing Accused Products perform a method comprising "monitoring a first availability of a first service, the first service having a first availability requirement and a first availability tolerance."

103. For example, the Broadcom Load Balancing Accused Products include a page

[119] *See, e.g.*, "Transform Your Apps and Cloud Faster with VMware Cloud," VMware Cloud Partners, VMware.com, https://www.vmware.com/solutions/cloud-partners/; "Build numbers and versions of VMware NSX/NSX-T Data Center," Broadcom.com (updated October 21, 2024), https://knowledge.broadcom.com/external/article/317797/build-numbers-and-versions-of-vmware-nsx.html; "VMware Avi Load Balancer Release Notifications," Broadcom.com (updated September 10, 2024), https://knowledge.broadcom.com/external/article/312808/vmware-avi-load-balancer-release-notific.html.

displaying monitored "virtual services," which includes virtual service "health."[120] The product documentation explains the health indicator "[d]isplays a numeric, color-coded health status of the virtual service," that "[a] red exclamation mark (!) indicates that the virtual service is down," and that "[a] dash appears if the virtual service is disabled, not deployed, or in error state."[121] The Broadcom Load Balancing Accused Products also have a "minimum and maximum scale-out per virtual service" setting which "govern[s] the number of [Service Engines (SEs)] across which a virtual service can be scaled."[122]

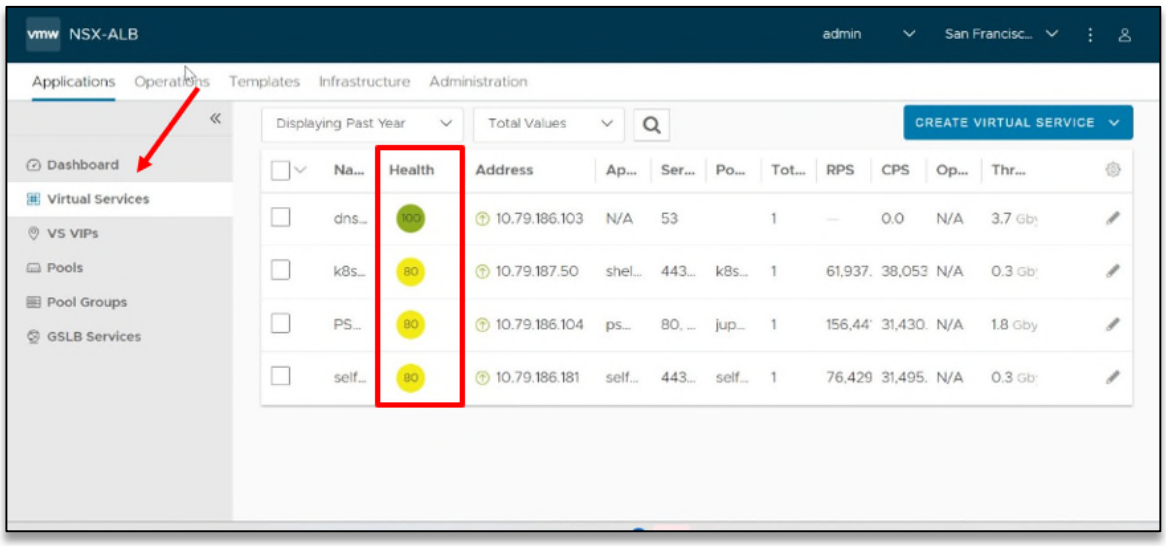


Figure 4. Screenshot from the NSX product webpage showing "virtual services" page with the "health" indicator highlighted in red.

104. The product documentation describes that the "service engines" discussed above are "data plane virtual machines:"

> The Avi Service Engine, also called the Service Engine, is the data plane virtual machine. A Service Engine runs one or more virtual services. A Service Engine is managed by the controller. The controller provisions Service Engines to host virtual services.[123]

---

[120] "VMware NSX Advanced Load Balancer 30.2," Broadcom.com (last updated November 11, 2024), https://techdocs.broadcom.com/us/en/vmware-security-load-balancing/avi-load-balancer/avi-load-balancer/30-2/vmware-avi-load-balancer-configuration-guide/load-balancing-overview/virtual-services.html.

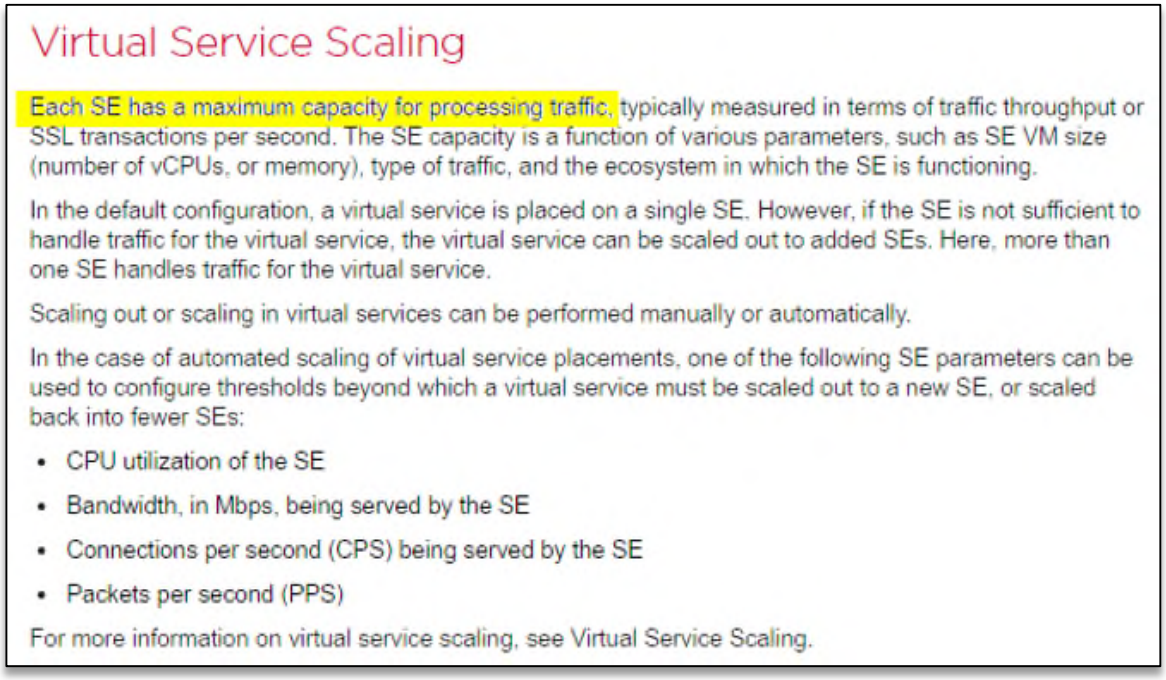
[121] *Id.*

[122] *Id.*

[123] "NSX Advanced Load Balancer Components," VMware.com (updated January 27, 2022), https://docs.vmware.com/en/VMware-vSphere/7.0/vmware-vsphere-with-tanzu/GUID-A247F5F2-AC7E-48E7-B615-

105. The Broadcom Load Balancing Accused Products perform the step of "detecting a reduction in the first availability of the first service."

106. Notably, as described, a SE has "a maximum capacity for processing traffic," meaning that as that capacity threshold is approached, the SE's ability to accommodate new traffic is reduced—meaning the availability of virtual service(s) running on the SE is also reduced.



Virtual Service Scaling

Each SE has a maximum capacity for processing traffic, typically measured in terms of traffic throughput or SSL transactions per second. The SE capacity is a function of various parameters, such as SE VM size (number of vCPUs, or memory), type of traffic, and the ecosystem in which the SE is functioning.

In the default configuration, a virtual service is placed on a single SE. However, if the SE is not sufficient to handle traffic for the virtual service, the virtual service can be scaled out to added SEs. Here, more than one SE handles traffic for the virtual service.

Scaling out or scaling in virtual services can be performed manually or automatically.

In the case of automated scaling of virtual service placements, one of the following SE parameters can be used to configure thresholds beyond which a virtual service must be scaled out to a new SE, or scaled back into fewer SEs:

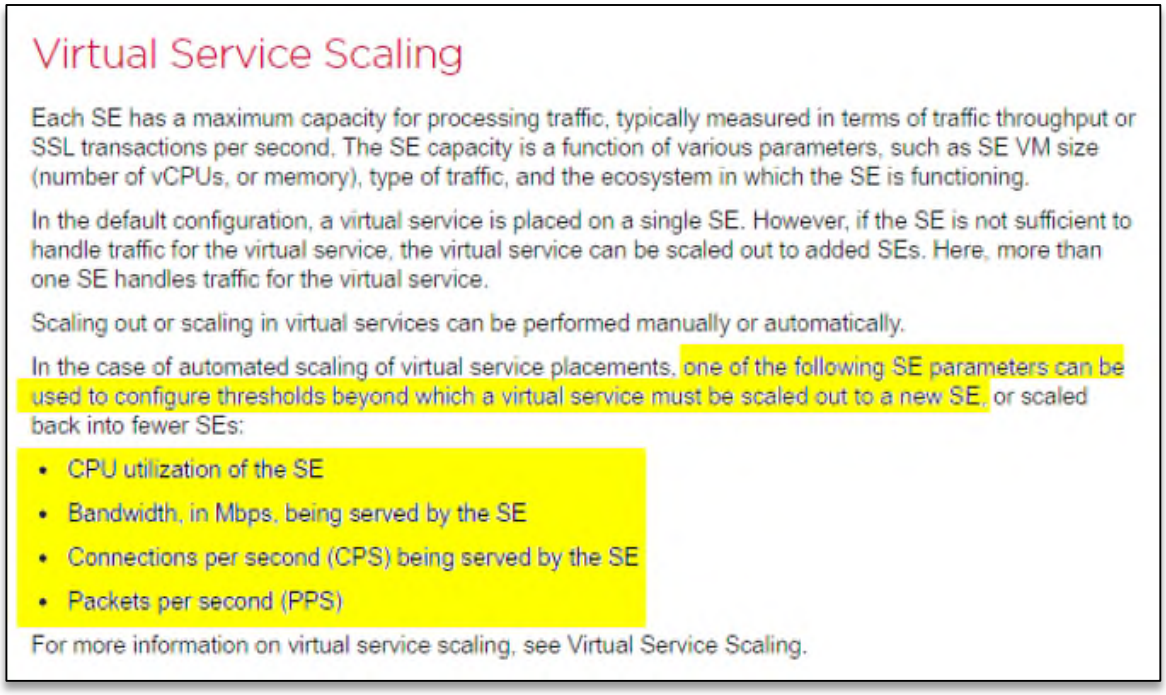
- CPU utilization of the SE
- Bandwidth, in Mbps, being served by the SE
- Connections per second (CPS) being served by the SE
- Packets per second (PPS)

For more information on virtual service scaling, see Virtual Service Scaling.

Figure 5. Screenshot from the NSX product webpage describing "virtual service scaling" with description of SE maximum capacity highlighted in yellow.

107. Relatedly, in addition to the virtual service health monitoring discussed above, the Broadcom Load Balancing Accused Products use metric-based thresholds to detect a reduction in availability virtual services within an SE for the purposes of scaling out the virtual service to additional SEs (at least to maintain virtual service availability).

F8D361C7292A.html#:~:text=The%20Avi%20Service%20Engine%2C%20also%20called%20the%20Service,controller%20provisions%20Service%20Engines%20to%20host%20virtual%20services.



Virtual Service Scaling

Each SE has a maximum capacity for processing traffic, typically measured in terms of traffic throughput or SSL transactions per second. The SE capacity is a function of various parameters, such as SE VM size (number of vCPUs, or memory), type of traffic, and the ecosystem in which the SE is functioning.

In the default configuration, a virtual service is placed on a single SE. However, if the SE is not sufficient to handle traffic for the virtual service, the virtual service can be scaled out to added SEs. Here, more than one SE handles traffic for the virtual service.

Scaling out or scaling in virtual services can be performed manually or automatically.

In the case of automated scaling of virtual service placements, one of the following SE parameters can be used to configure thresholds beyond which a virtual service must be scaled out to a new SE, or scaled back into fewer SEs:

- CPU utilization of the SE
- Bandwidth, in Mbps, being served by the SE
- Connections per second (CPS) being served by the SE
- Packets per second (PPS)

For more information on virtual service scaling, see Virtual Service Scaling.

Figure 6. Screenshot from the NSX product webpage describing "virtual service scaling" with description thresholds for "scaling out" highlighted in yellow.

108. As one example, when automatic scaling is enabled, the Broadcom Load Balancing Accused Products detect "when the SE CPU exceeds an 80% average" to consider whether to perform a virtual service scale out or migration operation.[124] After detecting that "the SE CPU exceeds an 80% average," the Broadcom Load Balancing Accused Products determine whether "one virtual service is generating more than 70% of the PPS [(packets per second)] for the SE."

[124] "VMware Avi Load Balancer 30.2," Broadcom.com (last updated October 31, 2024), https://techdocs.broadcom.com/us/en/vmware-security-load-balancing/avi-load-balancer/avi-load-balancer/30-2/vmware-avi-load-balancer-configuration-guide/load-balancing-overview/autoscale-service-engines/automated-versus-manual-scaling.html.

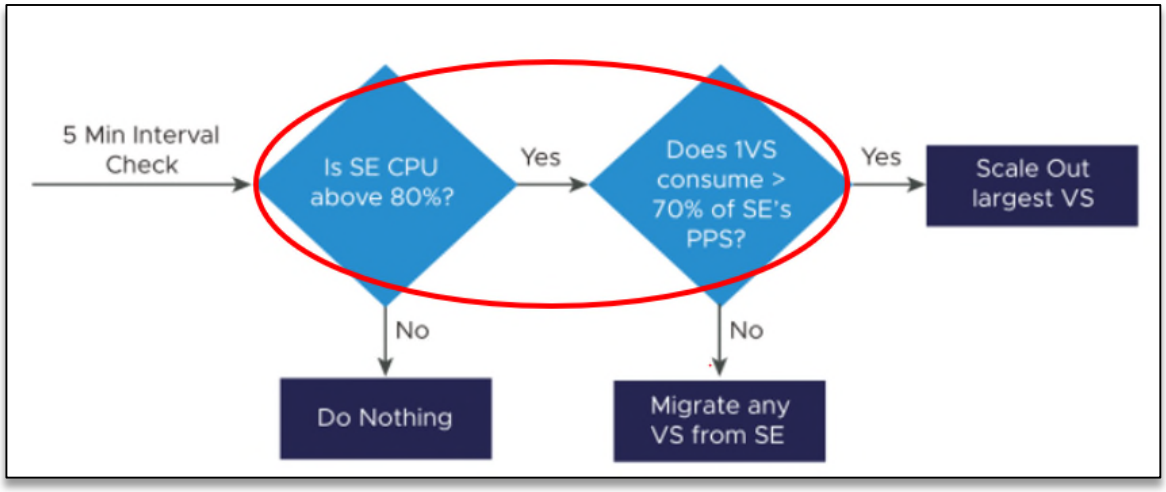


Figure 7. Screenshot from product webpage showing flowchart for automatic scaling with first branching decision highlighted in red.

109. The Broadcom Load Balancing Accused Products perform the step of "creating capacity for the first service by deactivating a second service on a first active virtual machine on a server, the second service having a second availability exceeding a second availability tolerance and having a second availability requirement lower than the first availability requirement."

110. In the example above, if the SE CPU usage exceeds 80% and it is determined that no virtual service on the SE meets the 70% of the SE's PPS threshold, "the Controller will elect to migrate a virtual service to another SE."[125] The product documentation explains how the migration operation behaves:[126]

> The migration process behaves similar to scaling. A new SE is added to an existing virtual service as a secondary. Shortly the Avi Load Balancer Controller will promote the secondary to become primary. The new SE will now handle all new connections, forwarding any older connections to the now secondary SE. *After 30 seconds, the old SE will terminate the remaining connections and be removed from the virtual service configuration.*

111. The product documentation explains that, after a migration operation, "[i]f further capacity is required, the virtual service can still be scaled out to additional SEs" (discussed below).[127]

[125] *Id.*

[126] *Id* (emphasis added).

[127] *Id.*

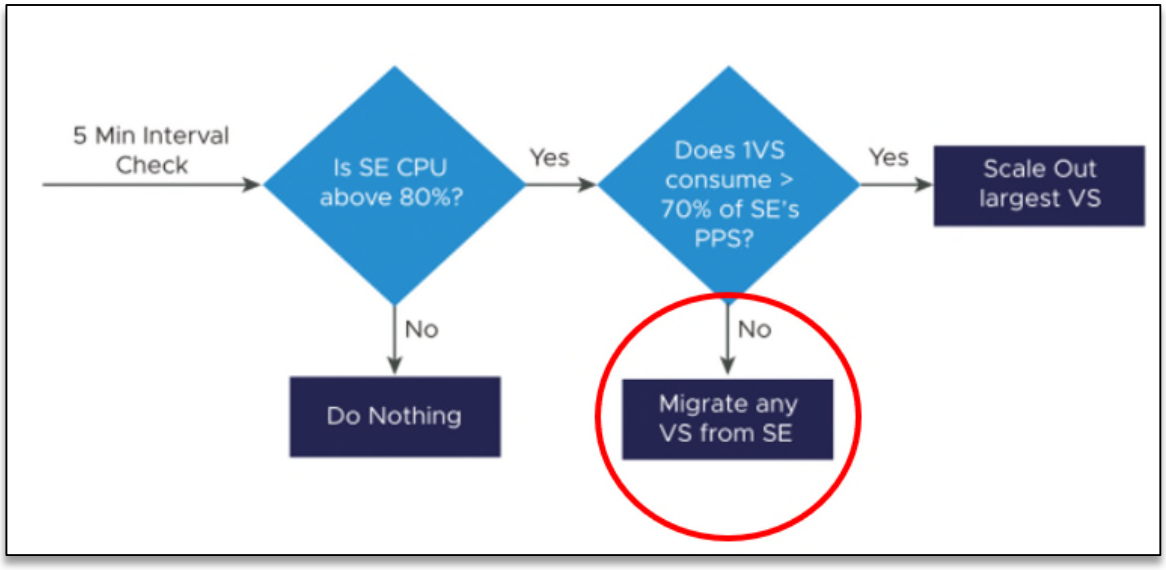


Figure 8. Screenshot from product webpage showing flowchart for automatic scaling with "migrate" outcome highlighted in red.

112. The Broadcom Load Balancing Accused Products perform the step of "activating a second active virtual machine executing the first service on the server."

113. In the example above, if it is determined that "one virtual service is [generating] more than 70% of the PPS for the SE," then that "virtual service will be scaled out." The product documentation explains the scale out operation:[128]

> As traffic increases beyond the capacity of a single SE, the Avi Load Balancer Controller can add one or more new SEs to the virtual service. These new SEs can process other virtual service traffic, or they can be newly created for this task. Existing SEs can be added within a couple of seconds, whereas instantiating a new SE VM may take up to several minutes, depending on the time necessary to copy the SE image to the virtual machine's host.

[128] "VMware Avi Load Balancer 30.2," Broadcom.com (last updated October 31, 2024), https://techdocs.broadcom.com/us/en/vmware-security-load-balancing/avi-load-balancer/avi-load-balancer/30-2/vmware-avi-load-balancer-configuration-guide/load-balancing-overview/autoscale-service-engines.html.

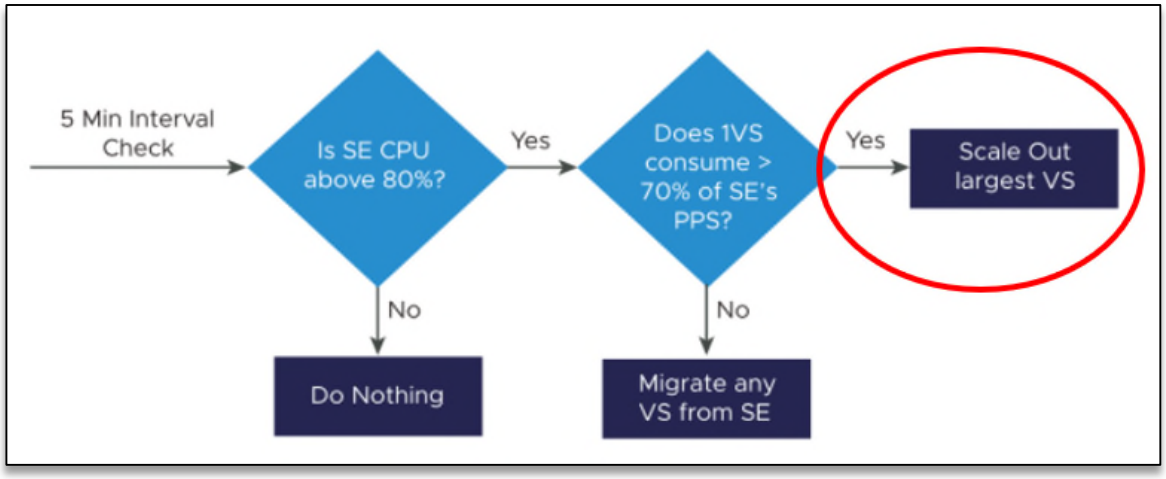


Figure 9. Screenshot from product webpage showing flowchart for automatic scaling with "scale out" outcome highlighted in red.

114. Accordingly, the Broadcom Load Balancing Accused Products perform all steps of Claim 6 of the '472 Patent.

DIRECT INFRINGEMENT

115. Broadcom and VMware, jointly and severally, have directly infringed, and Broadcom and VMware continue to infringe, the '472 Patent in multiple ways.

116. Broadcom and VMware directly infringe the '472 Patent at least when they perform the claimed methods of the '472 Patent, in violation of at least 35 U.S.C. § 271(a), by providing the Broadcom Load Balancing Accused Products as a service.

Figure 10. Annotated screenshot from VMware Cloud Tech Zone FAQ page explaining the VMware Cloud on AWS Service and how to sign up.[129]

117. When a customer signs up for and uses a NSX cloud-based service (*e.g.*, VMware Cloud on AWS), Broadcom and VMware perform the claimed methods as detailed above by controlling and maintaining responsibility for the infringing functionality.

[129] "VMware Cloud on AWS Frequently Asked Questions," VMware.com (copyright 2005-2024), https://www.vmware.com/docs/vmware-cloud-on-aws-frequently-asked-questions.

118. Broadcom and VMware also condition the benefit of the Broadcom Load Balancing Accused Products on Broadcom and VMware's partners performing the infringing functionality and Broadcom and VMware's control of the manner and timing of said performance. For example, Broadcom and VMware maintain a "Shared Responsibility Model" that is "common among the different VMware Cloud Providers" and "defines distinct roles and responsibilities between the VMware Cloud Infrastructure Services provider and an organization consuming the service."[130] As shown below, Broadcom and VMware maintain responsibility for the "NSX Lifecycle." As further confirmation, when describing the AWS implementation, Broadcom and VMware describe one of the goals of the shared responsibility model as being to "[p]rotect VMware-managed objects" including "management appliances" and "hosts."[131] The "management appliances" and "hosts" execute code performing the steps of Claim 1 described above.

[130] "VMware Cloud Well-Architected Framework for VMware Cloud on AWS," VMware.com (copyright 2023), https://docs.vmware.com/en/VMware-Cloud-Well-Architected-Framework/services/vmcwaf-aws.pdf.

[131] "VMware Cloud on AWS: vCenter Architecture," WMware.com (copyright 2005-2024), https://vmc.techzone.vmware.com/vmc-arch/docs/compute/vmc-aws-vcenter-architecture#sec27179-sub1.

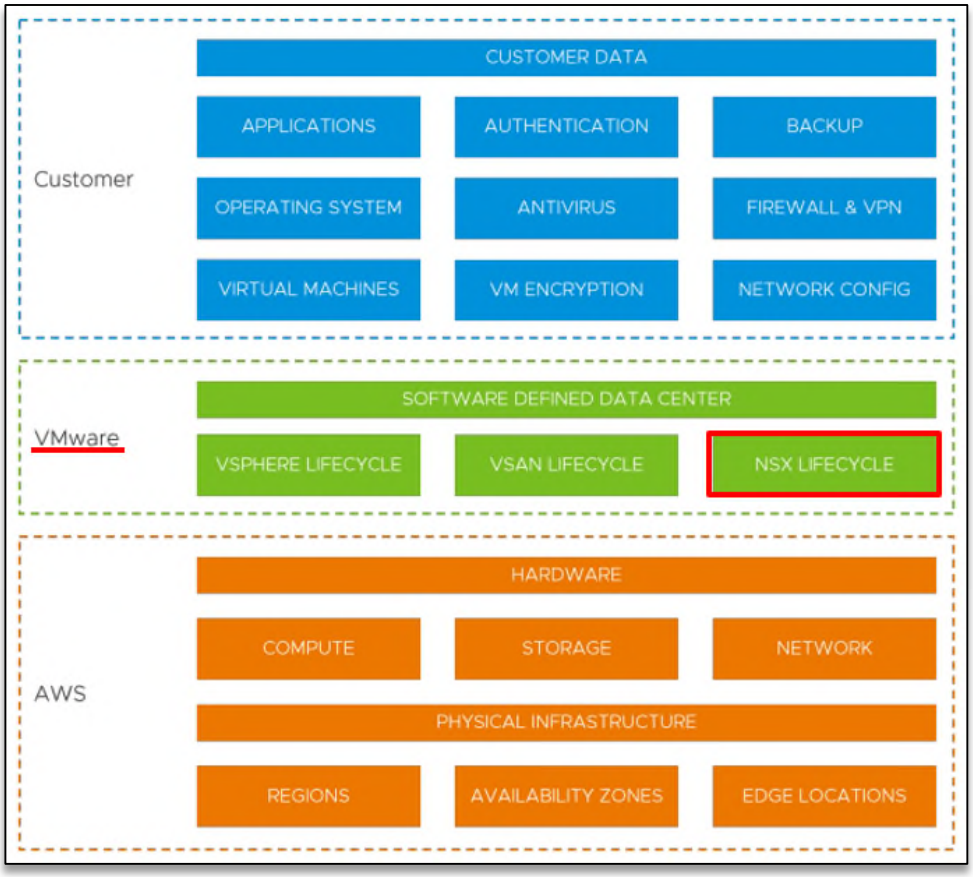


Figure 11. Annotated diagram from the "VMware Cloud Well-Architected Framework for VMware Cloud on AWS" document splitting responsibility between the customer, Broadcom/VMware, and AWS and showing NSX as a responsibility of VMware highlighted in red.

119. Broadcom and VMware also benefit from their control of the manner and timing of the user's performance of the claimed methods. For example, Broadcom reported that VMware Cloud Foundation represented 80% of its total VMware products booking during its third fiscal quarter of 2024, from which Broadcom received $2.5 billion in revenue.[132]

120. Broadcom and VMware also directly infringe by using the claimed method to demonstrate, test, install, and configure the Broadcom Load Balancing Accused Products for their customers. For example, Broadcom and VMware directly infringe by using the Broadcom Load Balancing Accused Products for demonstrating via VMware Hands-on Labs, *infra*.

INDIRECT INFRINGEMENT: INDUCEMENT

121. Broadcom and VMware have had actual knowledge of the '472 Patent and their infringement by the Broadcom Load Balancing Accused Products since at least December 23, 2024,

[132] Broadcom (AVGO) Q3 2024 Earnings Call Transcript, Motley Fool Transcribing, Fool.com (September 5, 2024), https://www.fool.com/earnings/call-transcripts/2024/09/05/broadcom-avgo-q3-2024-earnings-call-transcript/.

when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments by email and/or December 27, 2024 when they were served the same letter in hard-copy. *See* Exhibit D. That letter identified the '472 Patent, the infringing products, and a brief explanation tying an example claim to the infringing activities. *See id.* Broadcom and VMware did not respond to that letter or otherwise alter its infringing conduct.

122. Netflix sent a second notice letter to Broadcom's and VMware's Legal Departments that was served on April 15, 2025. *See* Exhibit E. Netflix reiterated in that letter that Broadcom and VMware should halt their infringing conduct with respect to the '472 Patent.

123. Broadcom and VMware are sophisticated entities who have engaged in extensive patent litigation across the country. For example, Broadcom has been involved in no less than 45 patent cases since 2002.[133] As another example, Broadcom has at least 83 IP professionals in its legal department.[134] Broadcom and VMware had ample time to review Netflix's notice of its infringing activities and deliberately chose to not respond or alter their infringing behavior.

124. Broadcom and VMware, jointly and severally, have actively induced and continue to actively induce infringement of at least Claim 6 of the '472 Patent in violation of at least 35 U.S.C. § 271(b).

125. Broadcom and VMware's customers directly infringe at least Claim 6 of the '472 Patent when they use the Broadcom Load Balancing Accused Products in the ordinary, customary, and intended way.

126. Broadcom and VMware's inducement includes, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the Broadcom Load Balancing Accused Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying the Broadcom Load Balancing Accused Products to consumers within the United States and instructing and encouraging such customers to use the

[133] This information was collected from the Docket Navigator research tool by searching for the party "Broadcom Inc." Notably, this estimate does not include other Broadcom entities or subsidiaries.

[134] This information was collected by searching Broadcom's LinkedIn "People" tab, using the search "intellectual property OR patent OR trademark OR copyright," and limiting to individuals listed under "Legal."

Broadcom Load Balancing Accused Products in the ordinary, customary, and intended way, which Broadcom and VMware know or should know infringes at least Claim 6 of the '472 Patent.

127. For example, in some cases, Broadcom and VMware sell the Broadcom Load Balancing Accused Products to their customers as software for installation on customer computer(s).[135] Whenever customers install the Broadcom Load Balancing Accused Products and use them to manage virtual services, for example, with the auto-rebalance feature enabled (*e.g.*, virtual service autoscaling), at least Claim 6 of the '472 Patent is performed. Broadcom and VMware specifically intend and instruct their customers to install the Broadcom Load Balancing Accused Products to manage virtual services with, for example, the auto-rebalance feature enabled and therefore specifically intend and instruct their customers to infringe. Broadcom and VMware have provided and continue to provide these instructions to infringe despite knowing of the '472 Patent and knowing or being willfully blind to the fact these activities infringe the '472 Patent.

128. By way of example, Broadcom and VMware's instructions to their customers to infringe are made at least through their creation and distribution of marketing, promotional, and instructional materials. The promotional and product literature for the Accused Products is designed to instruct, encourage, enable, and facilitate the user of the Broadcom Load Balancing Accused Products to use the Broadcom Load Balancing Accused Products in a manner that directly infringes the '472 Patent. And Broadcom and VMware provide instructions, support, and technical assistance to their customers in support of committing the infringement.

129. One nonlimiting example of Broadcom and VMware's inducement includes at least their creation, distribution, and instruction to customers in VMware Hands-on Labs for NSX.[136]

[135] *See, e.g.*, "NSX Installation Guide," VMware.com (modified September 9, 2024), https://docs.vmware.com/en/VMware-NSX/4.1/nsx_41_install.pdf; VMware Avi Load Balancer Installation Guide, VMware Avi Load Balancer 30.2, VMware.com (copyright 2024), https://docs.vmware.com/en/VMware-Avi-Load-Balancer/30.2/Installation-Guide.pdf.

[136] *See, e.g.*, "Try VMware NSX Hands-on Labs for Free," VMware.com https://www.vmware.com/info/nsx/hol; FAQ, VMware.com, https://www.vmware.com/resources/hands-on-labs/faq.

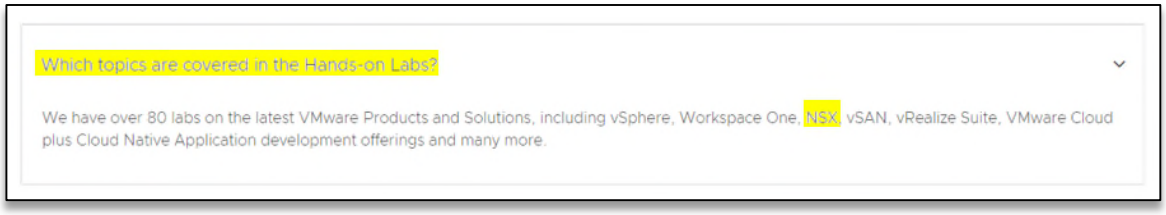


Figure 12. Screenshot from VMware Hands-on Lab FAQ page showing application to NSX products.

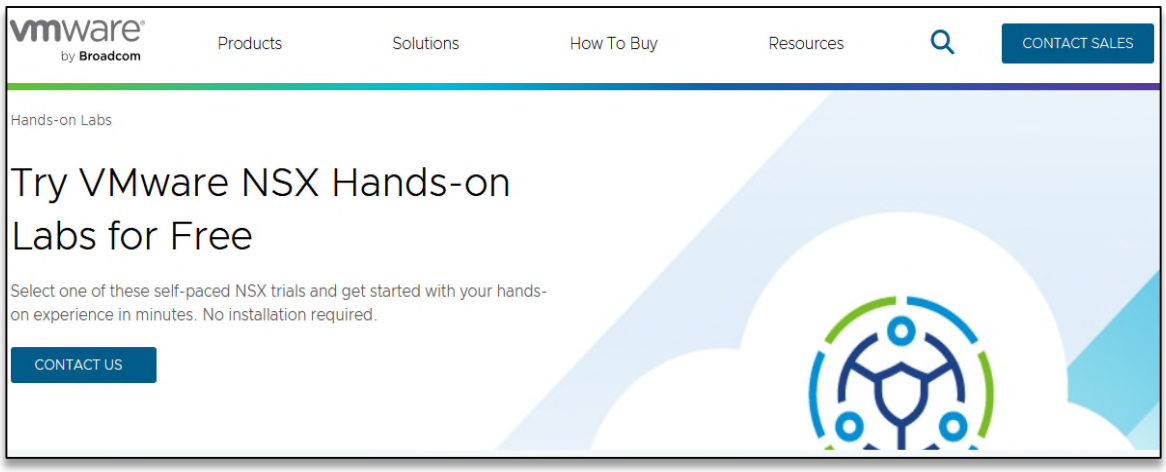


Figure 13. Screenshot from VMware NSX Hands-on Lab page offering customers the chance to experience NSX in minutes.

130. On the official VMware YouTube page, Broadcom and VMware explain that VMware Hands-On Labs "delivers a real virtualized infrastructure in the cloud powered by VMware" to let customers "try out products from the convenience of [their] browser."[137] It is further explained that "each self-paced lab is guided with a manual and built in modules so you can take all or just part of a lab and come and go from labs as often as you like."[138]

[137] "What are VMware Hands-on Labs?," VMware YouTube Channel, YouTube.com (June 25, 2014), https://www.youtube.com/watch?v=XggYeVsK_R0, 0:25-32.

[138] *Id.*, 0:34-42.

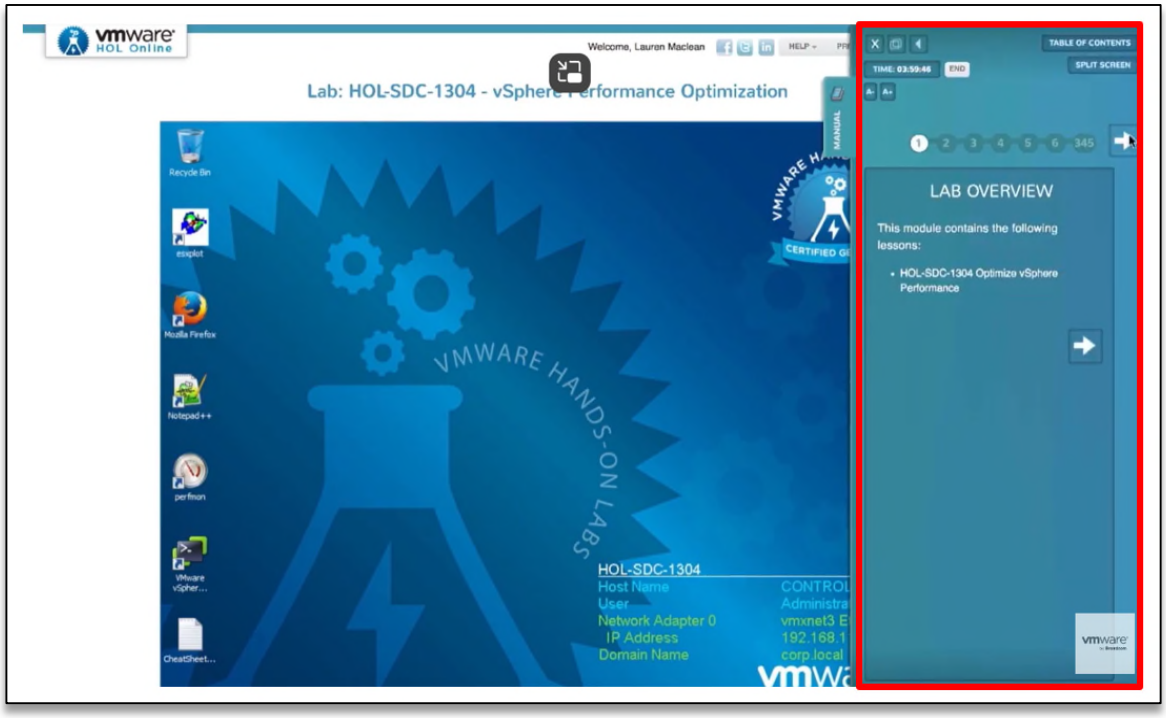


Figure 14. Screenshot from VMware YouTube video titled "What are VMware Hands-on Labs?," showing VMware Hands-on Lab Environment highlighted with in-lab manual highlighted in red.

131. Broadcom and VMware offer VMware Hands-on Labs directly related to use of NSX functionality that infringes the '102 Patent. For example, a VMware Hands-on Lab is offered on "Getting started with VMware Avi load balancer (HOL-2571-01-ANS-L)," which it describes as allowing users to "[e]xplore VMware Avi Load Balancer to see how easy it is to apply load balancing and application-aware security to any application in a multi-cloud environment." This exemplar

132. y lab has specific modules on "Avi architecture," "Applications (Virtual Services and Related Components)," and "Application Scaling."

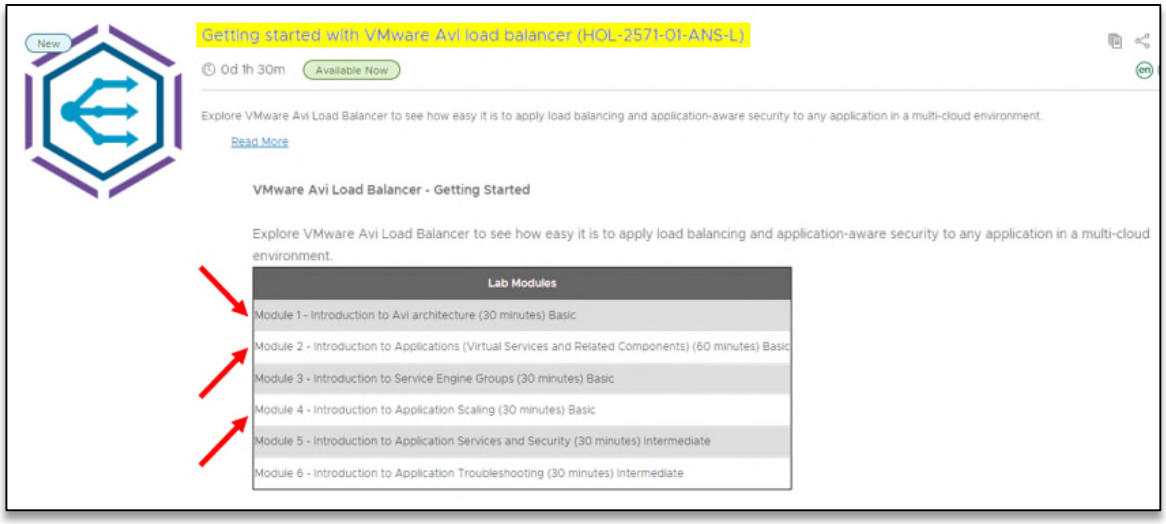


Figure 15. Screenshot from VMware Hands-on Lab Catalog for "Getting started with VMware Avi load balancer (HOL-2571-01-ANS-L)" with the title highlighted in yellow and red arrows highlighting specific modules.

133. Broadcom and VMware thus encourage their customers to infringe the '472 Patent at least by instructing customers on how to infringe by providing "manuals and built in modules" in proximity to "actual VMware products" for customers to practice infringing conduct through the VMware Hands-on Labs.

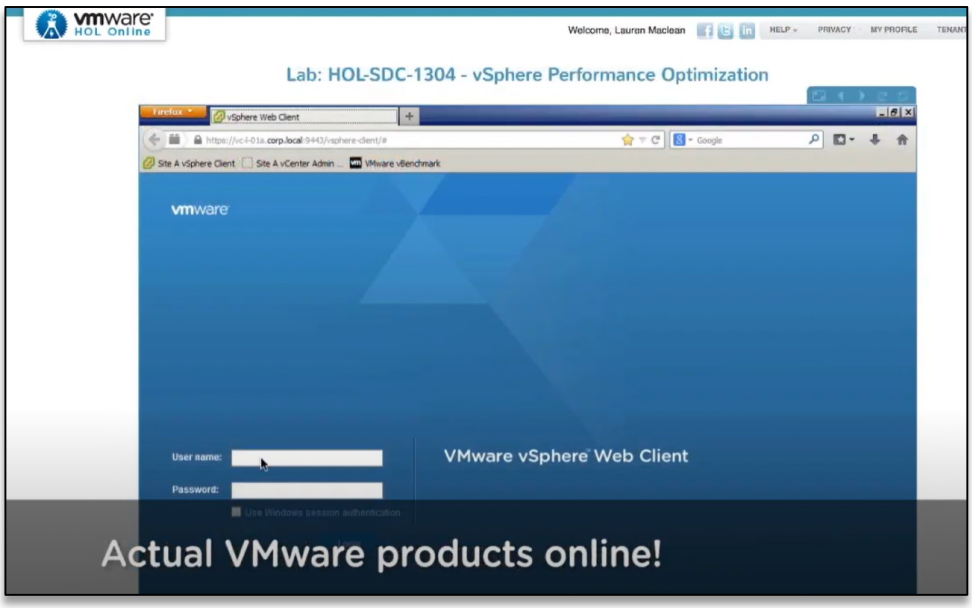


Figure 16. Screenshot from VMware YouTube video titled "What are VMware Hands-on Labs?"

134. Besides the VMware Hand-on Labs example discussed above, Broadcom and VMware publicly share numerous instructions, troubleshooting manuals, and product documentations through Broadcom's support portal (https://support.broadcom.com/) and at https://techdocs.broadcom.com/us/en/vmware-security-load-balancing/avi-load-balancer.html.

135. Like the Hands-on Labs discussed above, these support documents also provide step-by-step instructions explaining how to use the Broadcom Load Balancing Accused Products in an infringing manner.

136. Thus, Broadcom and VMware have induced their customers to infringe the '472 Patent. Broadcom and VMware's knowing inducement of their customers to infringe has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

INDIRECT INFRINGEMENT: CONTRIBUTORY INFRINGEMENT

137. Broadcom and VMware have actively contributed to infringement of at least Claim 6 of the '472 Patent in violation of at least 35 U.S.C. § 271(c). Broadcom and VMware sell the Broadcom Load Balancing Accused Products, which include components specially made or especially adapted to practice the method claimed in at least Claim 6 of the '472 Patent.

138. The infringing components of the Broadcom Load Balancing Accused Products have no substantial function or use other than to practice the invention claimed in at least Claim 6 of the '472 Patent at least because infringement of the claimed method is performed automatically when customers use the Broadcom Load Balancing Accused Products installed on a computer system with the auto-rebalance feature enabled.

139. The Broadcom Load Balancing Accused Products include material components of the claimed method recited in at least Claim 6 of the '472 Patent and are not a staple article or commodity of commerce, including because they are specifically configured to infringe according to at least Claim 6 of the '472 Patent (*see* ¶¶ 100-120).

140. Broadcom and VMware's contributory infringements include, without limitation, making, offering to sell, and/or selling within the United States, and/or importing into the United States, the Broadcom Load Balancing Accused Products, which each include one or more components for use in practicing at least Claim 6 of the '472 Patent, knowing the component(s) to be especially made or especially adapted for use in an infringement of at least Claim 6 of the '472 Patent (*see* ¶¶ 100-138), and not a staple article or commodity of commerce suitable for

substantial non-infringing use.

WILLFUL INFRINGEMENT

141. As detailed above, Broadcom and VMware had knowledge of the '472 Patent and had knowledge, or were willfully blind, as to Broadcom's and VMware's infringement of the '472 Patent.

142. Broadcom and VMware's infringement of the '472 Patent has been and is willful and deliberate.

143. As discussed above, Broadcom and VMware have had actual knowledge of the '472 Patent since at least December 23, 2024, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments by email and/or December 27, 2024 when they were served the same letter in hard-copy.

144. As discussed above, Broadcom knew or should have known that its actions infringe and actively induce infringement of the '472 Patent.

145. As discussed above, Broadcom specifically intended that both itself and/or its customers infringe the '472 Patent.

146. Broadcom and VMware's willfulness is further evidenced by VMware's demonstrated culture of knowingly using patented technology.[139] Copying other people's patents is circumstantial evidence of willful infringement and it appears the Accused Products are copies of the Asserted Patents. Further, VMware's former CEO, who served in that role for ten (10) years, from October 2013 to December 2023, allegedly testified in deposition that VMware has a culture of copying.[140] Upon information and belief, Broadcom continues VMware's culture of copying today.

147. Broadcom and VMware's willfulness is further evidenced by VMware's culture of willful blindness toward patents, including intentionally not reviewing third-party patents when any rational actor would understand—based on, for example, the application rejections in VMware's

[139] *See, e.g., Cirba Inc. (d/b/a Densify) v. VMware, Inc.*, Case No. 1:19-cv-00742-GBW ("*Cirba*"), ECF 1528; 1:19-cv-00742-GBW ECF 1848.

[140] *Cirba*, 1:19-cv-00742-GBW ECF 1529, 1531.

patent applications—that a substantial risk of infringement exists.[141] Upon information and belief, Broadcom continues that culture today.

148. In fact, two separate juries have found VMware committed willful infringement, in part, because of VMware's culture of copying and refusing to review third-party patents during a time period relevant to this matter.[142] Upon information and belief, Broadcom continues the pattern and practice of willful infringement today.

149. Thus, Broadcom and VMware have willfully infringed the '472 Patent. Broadcom and VMware's knowing and willful infringement has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

SECOND CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,313,102 (the "'102 Patent")

150. Netflix incorporates by reference all preceding paragraphs, *supra*.

151. Broadcom and VMware, jointly and severally, have infringed and continue to infringe, at least Claims 1-11 of the '102 Patent, either literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale within the United States and/or importing into the United States products that are covered by at least Claims 1-11 of the '102 Patent. These products include, but are not limited to, VMware Cloud Foundation, VMware Cloud on AWS, Azure VMware Solution, Google Cloud VMware Engine, Oracle Cloud VMware Solution, IBM Cloud for VMware Solutions, Alibaba Cloud VMware Service, as well as any other products and/or services incorporating VMware NSX/NSX-T Data Center[143] (collectively, the "Broadcom Subnet Provisioning Accused Products").

152. Claim 1 of the '102 Patent recites:

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[141] *See, e.g.*, *Cirba*, ECF Nos. 1529, ECF 1531, ECF 1848.

[142] *Cirba Inc. (d/b/a Densify) v. VMware, Inc.*, Case No. 1:19-cv-00742-GBW, ECF Nos. 577, 1785.

[143] *See, e.g.*, "Transform Your Apps and Cloud Faster with VMware Cloud," VMware Cloud Partners, VMware.com, https://www.vmware.com/solutions/cloud-partners/; "Build numbers and versions of VMware NSX/NSX-T Data Center," Broadcom.com (updated October 21, 2024), https://knowledge.broadcom.com/external/article/317797/build-numbers-and-versions-of-vmware-nsx.html.

> A method for provisioning subnets, the method comprising:
>
> grouping the subnets into subnet groups based on logical properties of the subnets;
>
> assigning to each network consumer those subnet groups that are accessible to that network consumer; and
>
> providing for constrained selection of a particular subnet by a network consumer accomplished by way of a graphical user interface with selectable fields, wherein the constrained selection includes (i) selecting a public or private type address space, (ii) if applicable, selecting a gateway device from amongst those gateway devices that are accessible to the network consumer, and (iii) selecting a subnet group from those subnet groups that are accessible to the network consumer, and (iv) selecting a subnet mask that represents a size of the particular subnet.

153. The Broadcom Subnet Provisioning Accused Products perform a method for provisioning subnets comprising "grouping the subnets into subnet groups based on logical properties of the subnets."

154. Broadcom and VMware's NSX Administration Guide provides instructions for configuring and managing networking for VMware NSX.[144] The NSX Administration Guide explains that "NSX Virtual Private Clouds (VPCs) is an abstraction layer that simplifies setting up self-contained virtual private cloud networks within an NSX project to consume networking and security services in a self-service consumption model." Within VPCs, users "can add subnets (networks) inside the NSX VPC that is assigned to them" where the "[s]ubnets are realized as overlay segments in the default transport zone of the project."[145] NSX provides for selecting from two groups of subnets based on the logical properties of the subnets. For example, NSX supports both tier-0 and tier-1 subnets.

---

[144] "NSX Administration Guide," VMware.com (modified October 9, 2024), https://docs.vmware.com/en/VMware-NSX/4.2/nsx_42_admn.pdf.

[145] *Id.*

If you configure route redistribution for the tier-0 gateway, you can select from two groups of sources: tier-0 subnets and advertised tier-1 subnets. The sources in the tier-0 subnets group are:

Source Type	Description
Connected Interfaces and Segments	Redistribute all subnets configured on Interfaces and routes related to tier-0 segments, tier-0 DNS Forwarder IP, tier-0 IPsec Local IP, tier-0 NAT types. Redistribute subnets configured on segments connected to tier-0.

Figure 17. Annotated NSX Administrator Guide discussing the tier-0 subnet group.

The sources in the advertised tier-1 and VPC subnets group are:

Source Type	Description
Connected Interfaces & Segments / VPC Subnets	■ Redistribute subnets configured on segments and advertised from the connected tier-1 gateway. ■ Redistribute subnets configured in NSX VPC and advertised from the connected NSX VPC. ■ NSX VPC advertises all its public subnets to the connected tier-0 gateway.

Figure 18. Annotated NSX Administrator Guide discussing the tier-1 subnet group.

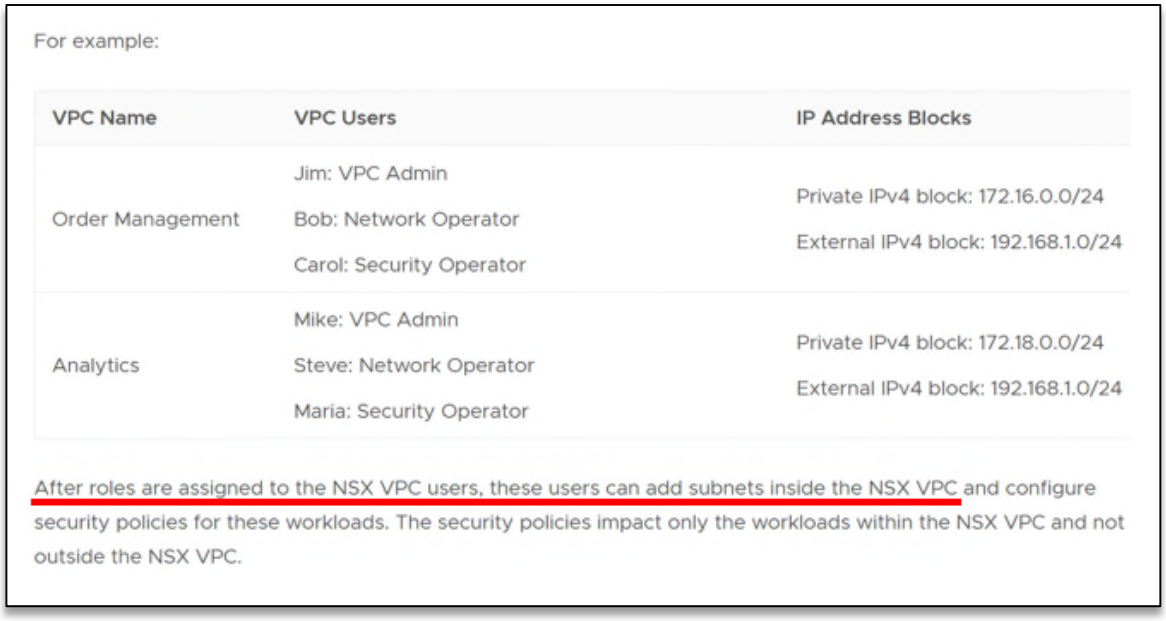
155. Broadcom and VMware explain that a "Tier-0 [logical router (LR)] connects to one or more physical routers northbound using Uplink Port and connects to Tier-1 LRs or directly to logical switches southbound via a downlink port" while a "Tier-1 LR connects to a Tier-0 LR (this link is known as RouterLink) northbound and it connects to one or more logical switches southbound using Downlink port."[146]

156. The Broadcom Subnet Provisioning Accused Products perform the step of "assigning to each network consumer those subnet groups that are accessible to that network consumer."

157. As discussed above, through NSX, users "can add subnets (networks) inside the NSX VPC that is assigned to them."[147]

[146] Amit Aneja, "NSX-T: Multi-Tiered Routing Architecture," VMware.com (February 20, 2018), https://blogs.vmware.com/networkvirtualization/2018/02/nsx-t-multi-tiered-routing-architecture.html.

[147] "NSX Administration Guide," VMware.com (modified October 9, 2024), https://docs.vmware.com/en/VMware-NSX/4.2/nsx_42_admn.pdf.



For example:

VPC Name	VPC Users	IP Address Blocks
Order Management	Jim: VPC Admin Bob: Network Operator Carol: Security Operator	Private IPv4 block: 172.16.0.0/24 External IPv4 block: 192.168.1.0/24
Analytics	Mike: VPC Admin Steve: Network Operator Maria: Security Operator	Private IPv4 block: 172.18.0.0/24 External IPv4 block: 192.168.1.0/24

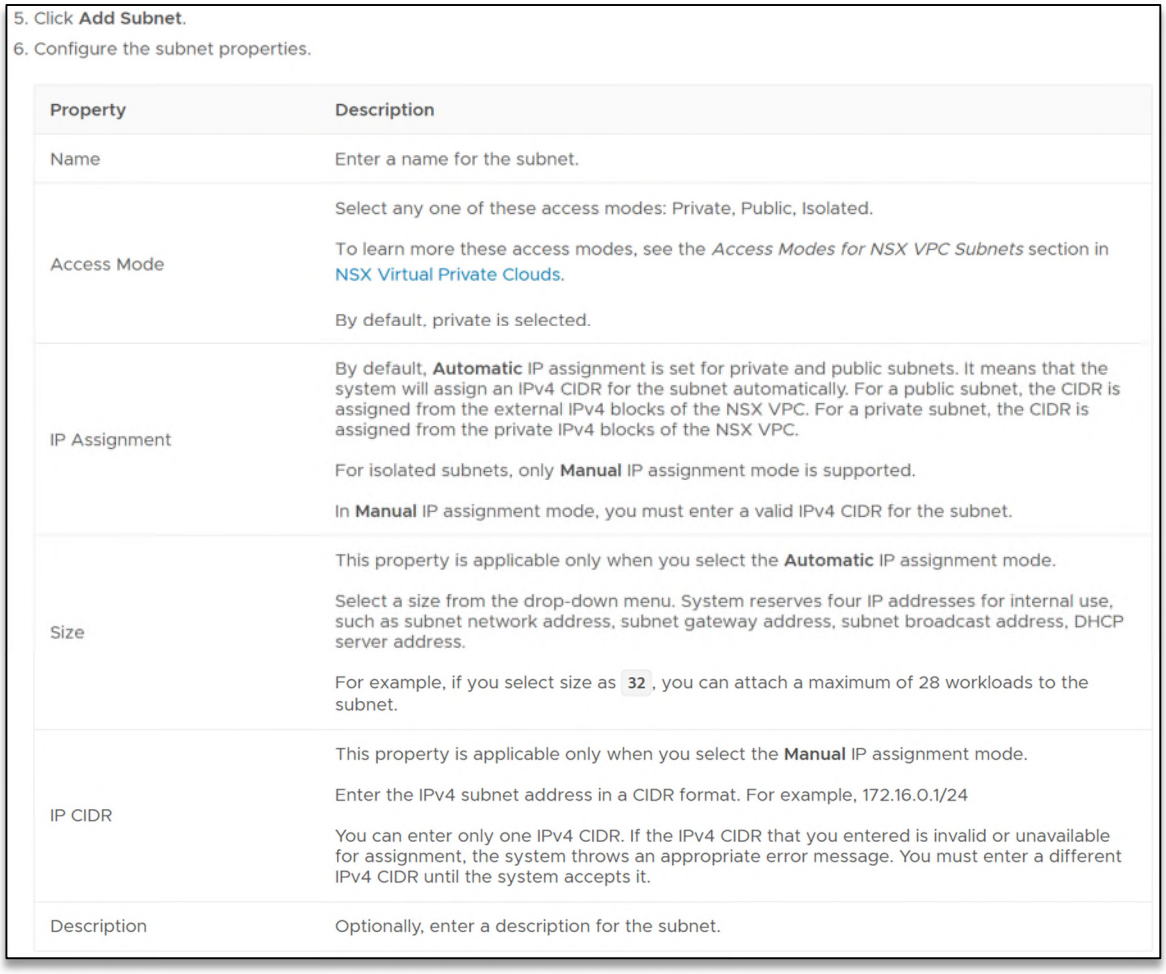
After roles are assigned to the NSX VPC users, these users can add subnets inside the NSX VPC and configure security policies for these workloads. The security policies impact only the workloads within the NSX VPC and not outside the NSX VPC.

Figure 19. Annotated NSX Administrator Guide discussing user's ability to add subnets inside the NSX VPC.[148]

158. The Broadcom Subnet Provisioning Accused Products perform the step of "providing for constrained selection of a particular subnet by a network consumer accomplished by way of a graphical user interface with selectable fields, wherein the constrained selection includes (i) selecting a public or private type address space, (ii) if applicable, selecting a gateway device from amongst those gateway devices that are accessible to the network consumer, and (iii) selecting a subnet group from those subnet groups that are accessible to the network consumer, and (iv) selecting a subnet mask that represents a size of the particular subnet."

159. When adding a subnet, the user can specify the following properties subnet properties: name, access mode, IP assignment, size, IP CIDR, and an optional description.

[148] "NSX Virtual Private Clouds," VMware.com (updated April 26, 2024), https://docs.vmware.com/en/VMware-NSX/4.2/administration/GUID-45670D79-7CBE-424D-B1D3-B9BB3B6D8C88.html.



5. Click **Add Subnet**.
6. Configure the subnet properties.

Property	Description
Name	Enter a name for the subnet.
Access Mode	Select any one of these access modes: Private, Public, Isolated. To learn more these access modes, see the *Access Modes for NSX VPC Subnets* section in NSX Virtual Private Clouds. By default, private is selected.
IP Assignment	By default, **Automatic** IP assignment is set for private and public subnets. It means that the system will assign an IPv4 CIDR for the subnet automatically. For a public subnet, the CIDR is assigned from the external IPv4 blocks of the NSX VPC. For a private subnet, the CIDR is assigned from the private IPv4 blocks of the NSX VPC. For isolated subnets, only **Manual** IP assignment mode is supported. In **Manual** IP assignment mode, you must enter a valid IPv4 CIDR for the subnet.
Size	This property is applicable only when you select the **Automatic** IP assignment mode. Select a size from the drop-down menu. System reserves four IP addresses for internal use, such as subnet network address, subnet gateway address, subnet broadcast address, DHCP server address. For example, if you select size as `32`, you can attach a maximum of 28 workloads to the subnet.
IP CIDR	This property is applicable only when you select the **Manual** IP assignment mode. Enter the IPv4 subnet address in a CIDR format. For example, 172.16.0.1/24 You can enter only one IPv4 CIDR. If the IPv4 CIDR that you entered is invalid or unavailable for assignment, the system throws an appropriate error message. You must enter a different IPv4 CIDR until the system accepts it.
Description	Optionally, enter a description for the subnet.

Figure 20. NSX Administrator Guide discussing subnet properties.

160. For example, as shown above in Figure 17, a user can specify whether the subnet uses a public, private, or isolated access mode. In a public subnet, "the IPv4 addresses in the public subnets are reachable both from the project and outside the project."[149] In contrast, "[w]orkloads on an isolated subnet can communicate with each other but cannot communicate with workloads on private or public subnets within the same NSX VPC" while "[w]orkloads that are attached to a private subnet can communicate with workloads on other private or public subnets within the same NSX VPC."[150] Figure 21 shows a user is able to specify a subnet within the IP address blocks made accessible to that user. Additionally, a user can select a size of the subnet from a drop-down menu. In at least some implementations of NSX, a user could also provision a subnet and specify the gateway IP:

[149] *Id.*

[150] *Id.*

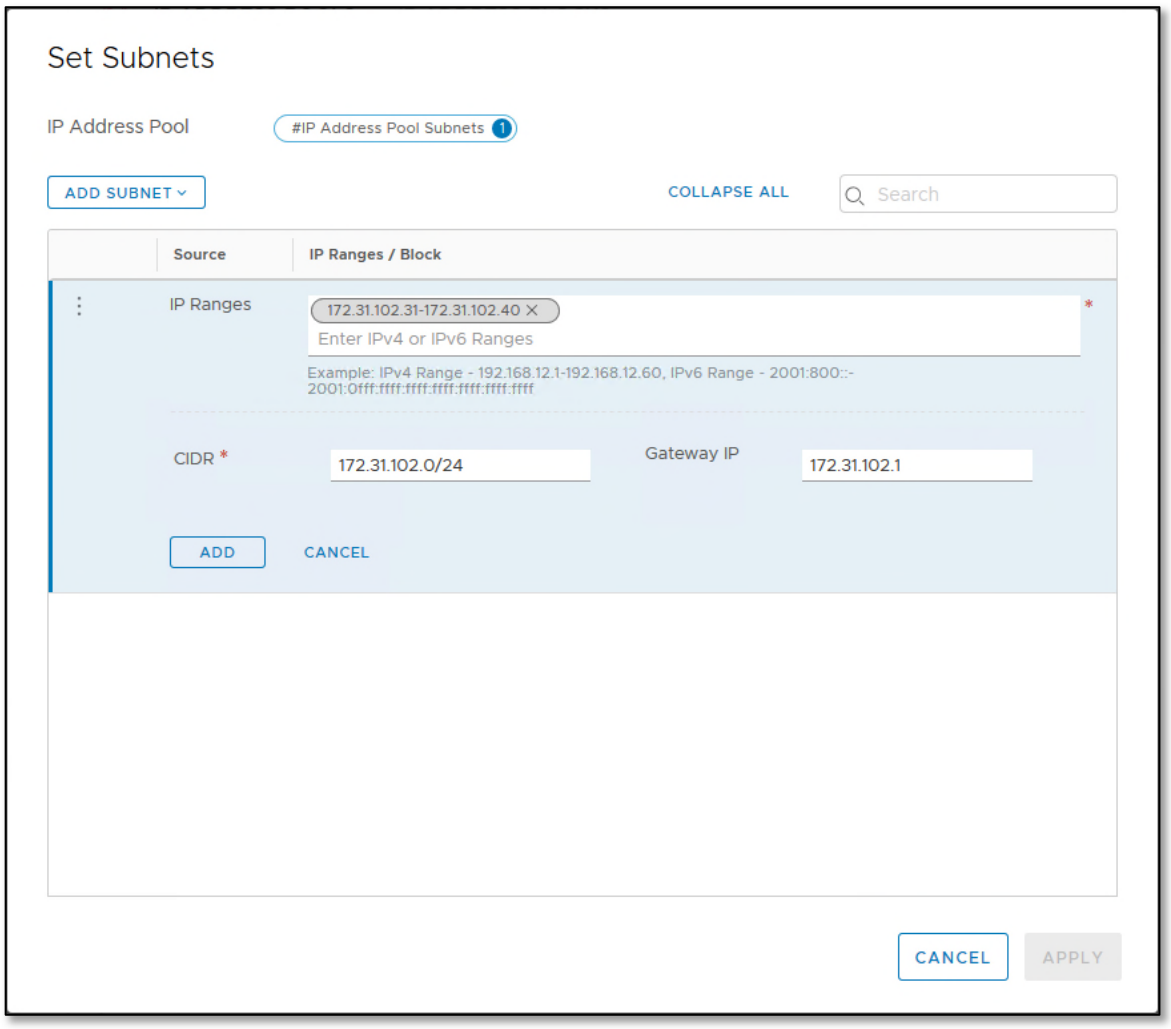


Figure 21. Showing support for Gateway IP specification as part of subnet provisioning in Broadcom's NSX.[151]

161. Broadcom and VMware's documents show that the subnet is successfully provisioned as overlay segments in the default transport zone of the project:

[151] "NSX-T: Configure NSX-T Manager 2.5," TheOddAngryShot.com (April 28, 2020), https://theoddangryshot.com/post/2020/nsxt-configure-nsxt-manager/. *See also* NSX-T Installation Series: Step 5 – Create IP Pool, ShuttleTitan.com (December 22, 2019), https://shuttletitan.com/nsx-t/nsx-t-installation-series/nsx-t-installation-series-step-5-create-ip-pool/.

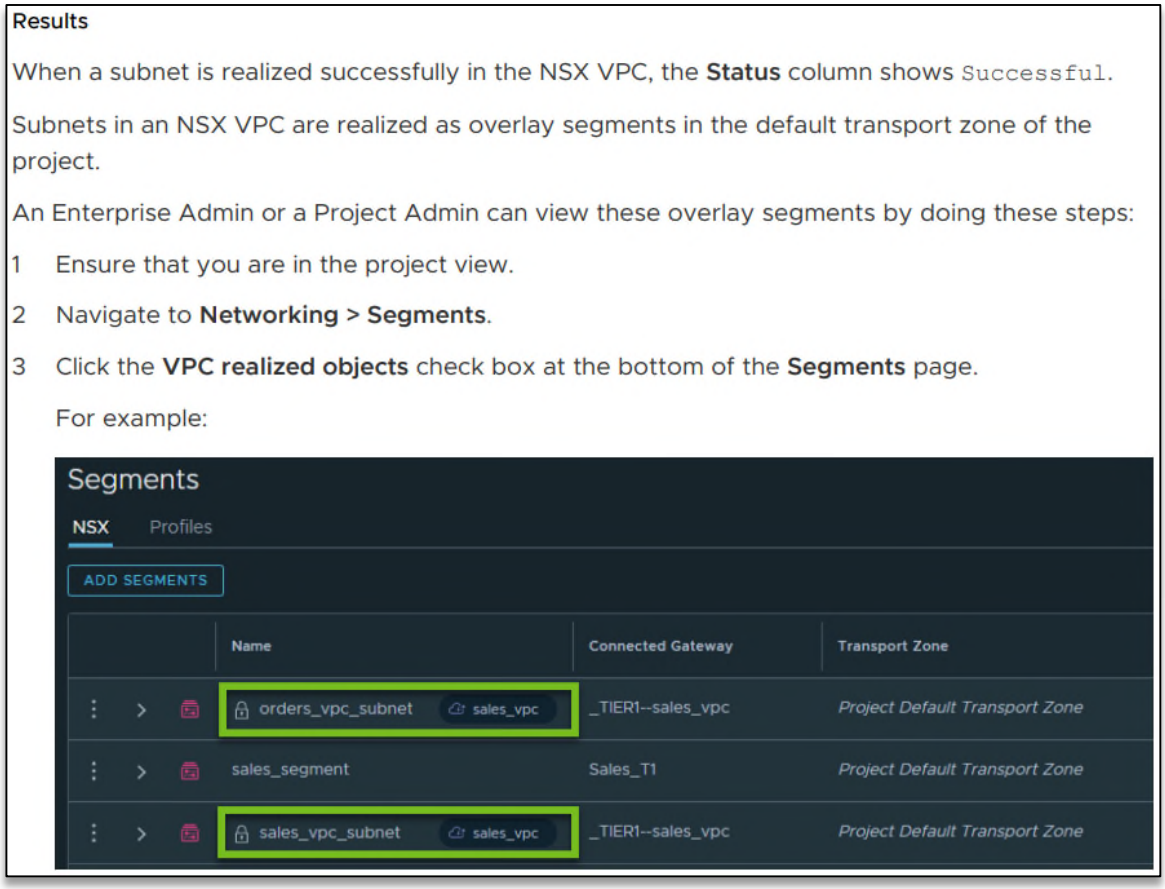


Figure 22. NSX Administrator Guide discussing admin roles.[152]

162. Accordingly, the Broadcom Subnet Provisioning Accused Products perform all steps of Claim 1 of the ’102 Patent.

DIRECT INFRINGEMENT

163. Broadcom and VMware directly infringe the ’102 Patent in multiple ways.

164. Broadcom and VMware directly infringe the ’102 Patent when they perform the claimed methods of the ’102 Patent, in violation of at least 35 U.S.C. § 271(a), by providing the Broadcom Subnet Provisioning Accused Products as a service.

[152] “Add a Subnet in an NSX VPC,” VMware.com (updated February 15, 2024), https://docs.vmware.com/en/VMware-NSX/4.2/administration/GUID-CC2A7BC0-3021-4312-AF8C-941A995EE8E5.html.

Figure 23. Annotated screenshot from VMware Cloud Tech Zone FAQ page explaining the VMware Cloud on AWS Service and how to sign up.

165. When a customer signs up for and uses a NSX cloud-based service (*e.g.*, VMware Cloud on AWS), Broadcom and VMware perform the claimed methods as discussed above by controlling and maintaining responsibility for the infringing functionality. Alternatively, Broadcom and VMware condition the benefit of the Broadcom Subnet Provisioning Accused Products on Broadcom's partners performing the infringing functionality and Broadcom and VMware's control of the manner and timing of said performance.

166. For example, Broadcom and VMware maintain a "Shared Responsibility Model" that is "common among the different VMware Cloud Providers" and "defines distinct roles and responsibilities between the VMware Cloud Infrastructure Services provider and an organization consuming the service."[153] As shown below, Broadcom and VMware maintain responsibility for the "vSphere Lifecycle." As further confirmation, when describing the AWS implementation, Broadcom and VMware describe one of the goals of the shared responsibility model as being to "[p]rotect VMware-managed objects" including "management appliances" and "hosts."[154] The "management appliances" and "hosts" execute code performing the steps of Claim 1 described above.

[153] "VMware Cloud Well-Architected Framework for VMware Cloud on AWS," VMware.com (copyright 2023), https://docs.vmware.com/en/VMware-Cloud-Well-Architected-Framework/services/vmcwaf-aws.pdf.

[154] "VMware Cloud on AWS: vCenter Architecture," WMware.com (copyright 2005-2024), https://vmc.techzone.vmware.com/vmc-arch/docs/compute/vmc-aws-vcenter-architecture#sec27179-sub1.

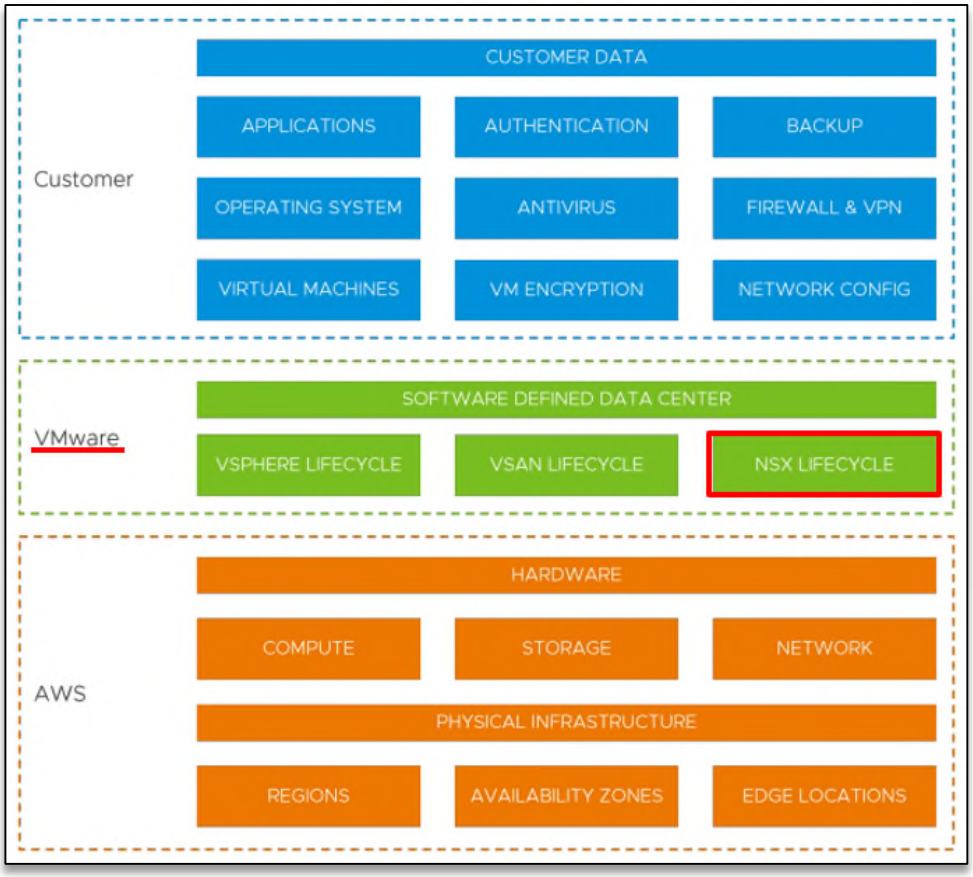


Figure 24. Annotated diagram from the "VMware Cloud Well-Architected Framework for VMware Cloud on AWS" document splitting responsibility between the customer, VMware, and AWS and showing vSphere as a responsibility of VMware highlighted in red.

As noted above, Broadcom and VMware also benefit from their control of the manner and timing of the user's performance of the claimed methods because, for example, Broadcom received $2.5 billion in revenue based on VMware Cloud Foundation.[155]

167. Broadcom and VMware also directly infringe by using the claimed method to demonstrate, test, install, and configure the Broadcom Subnet Provisioning Accused Products for their customers. For example, Broadcom directly infringes by using the Broadcom Subnet Provisioning Accused Products for demonstrating via VMware Hands-on Labs, *infra*.

INDIRECT INFRINGEMENT: INDUCEMENT

168. Broadcom and VMware have had actual knowledge of the '102 Patent and their infringement by the '102 Accused Products since at least December 23, 2024, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments. *See* Exhibit D. That letter identified

[155] Broadcom (AVGO) Q3 2024 Earnings Call Transcript, Motley Fool Transcribing, Fool.com (September 5, 2024), https://www.fool.com/earnings/call-transcripts/2024/09/05/broadcom-avgo-q3-2024-earnings-call-transcript/.

the '102 Patent, the infringing products, and a brief explanation tying an example claim to the infringing activities. *See id.* Broadcom and VMware did not respond to that letter or otherwise alter its infringing conduct.

169. Netflix sent a second notice letter to Broadcom's and VMware's Legal Departments that was served on April 15, 2025. *See* Exhibit E. Netflix reiterated in that letter that Broadcom and VMware should halt their infringing conduct with respect to the '102 Patent.

170. Broadcom and VMware are sophisticated entities who have engaged in extensive patent litigation across the country. For example, Broadcom has been involved in no less than 45 patent cases since 2002.[156] As another example, Broadcom has at least 83 IP professionals in its legal department.[157] Broadcom and VMware had ample time to review Netflix's notice of its infringing activities and deliberately chose to not respond or alter their infringing behavior.

171. Broadcom and VMware, jointly and severally, have actively induced and continue to actively induce infringement of at least Claim 1 of the '102 Patent in violation of at least 35 U.S.C. § 271(b).

172. Broadcom and VMware's customers directly infringe at least Claim 1 of the '102 Patent when they use the Broadcom Subnet Provisioning Accused Products in the ordinary, customary, and intended way. Broadcom and VMware's inducements include, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the Broadcom Subnet Provisioning Accused Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying the Broadcom Subnet Provisioning Accused Products to consumers within the United States and instructing and encouraging such customers to use the Broadcom Subnet Provisioning Accused Products in the ordinary, customary, and intended way, which Broadcom knows or should know infringes at least Claim 1 of the '102 Patent.

[156] This information was collected from the Docket Navigator research tool by searching for the party "Broadcom Inc." Notably, this estimate does not include other Broadcom entities or subsidiaries.

[157] This information was collected by searching Broadcom's LinkedIn "People" tab, using the search "intellectual property OR patent OR trademark OR copyright," and limiting to individuals listed under "Legal."

173. Broadcom and VMware sell the Broadcom Subnet Provisioning Accused Products as software for installation on customer computer(s).[158] When Broadcom's customers install the Broadcom Subnet Provisioning Accused Products and provision a subnet, at least Claim 1 of the '102 Patent is performed. In at least this way, the customers of Broadcom directly infringe the '102 Patent ***while*** Broadcom and VMware know of the '102 Patent, know or should know that these activities infringe the '102 Patent, and specifically intend and instruct for their customers to infringe. Broadcom and VMware have provided and continue to provide these instructions to infringe despite knowing of the '102 Patent and knowing or being willfully blind to the fact these activities infringe the '102 Patent.

174. Broadcom and VMware's instructions to their customers to infringe are made at least through their creation and distribution of marketing, promotional, and instructional materials. The promotional and product literature for the Accused Products is designed to instruct, encourage, enable, and facilitate the user of the Broadcom Subnet Provisioning Accused Products to use the Broadcom Subnet Provisioning Accused Products in a manner that directly infringes the '102 Patent. And Broadcom and VMware provide instructions, support, and technical assistance to their customers in support of committing the infringement.

175. One nonlimiting example of Broadcom and VMware's inducement includes at least VMware Hands-on Labs for NSX-based products.[159]

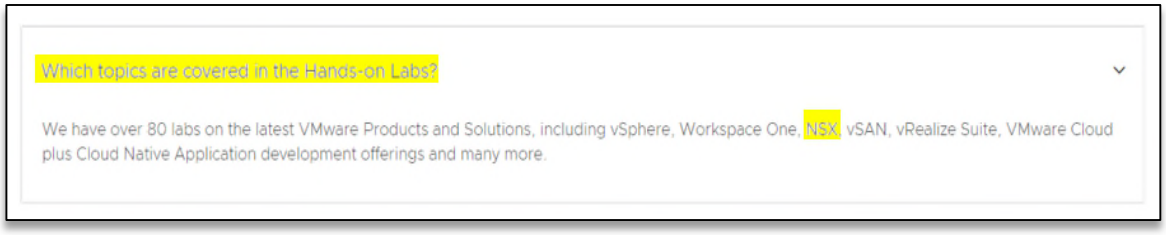


Figure 25. Screenshot from VMware Hands-on Lab FAQ page showing application to NSX products.

[158] *See, e.g.*, "NSX Installation Guide," VMware.com (modified September 9, 2024), https://docs.vmware.com/en/VMware-NSX/4.1/nsx_41_install.pdf; VMware Avi Load Balancer Installation Guide, VMware Avi Load Balancer 30.2, VMware.com (copyright 2024), https://docs.vmware.com/en/VMware-Avi-Load-Balancer/30.2/Installation-Guide.pdf.

[159] *See, e.g.*, "Try VMware NSX Hands-on Labs for Free," VMware.com https://www.vmware.com/info/nsx/hol; FAQ, VMware.com, https://www.vmware.com/resources/hands-on-labs/faq.

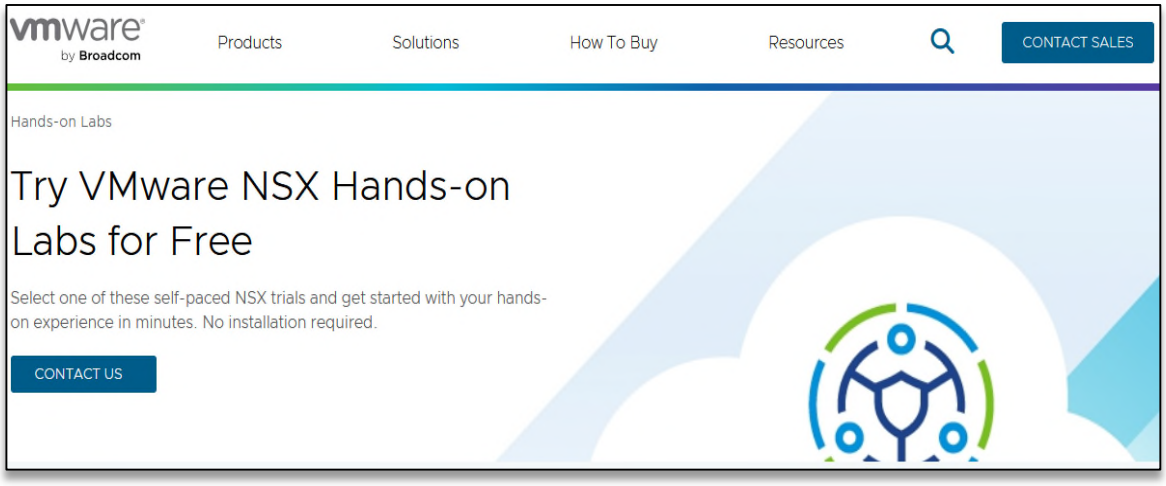


Figure 26. Screenshot from VMware NSX Hands-on Lab page offering customers the chance to experience NSX in minutes.

176. On Broadcom's official VMware YouTube page, Broadcom and VMware explain that VMware Hands-On Labs "delivers a real virtualized infrastructure in the cloud powered by VMware" to let customers "try out products from the convenience of [their] browser."[160] Broadcom and VMware further explain that "each self-paced lab is guided with a manual and built in modules so you can take all or just part of a lab and come and go from labs as often as you like."[161]

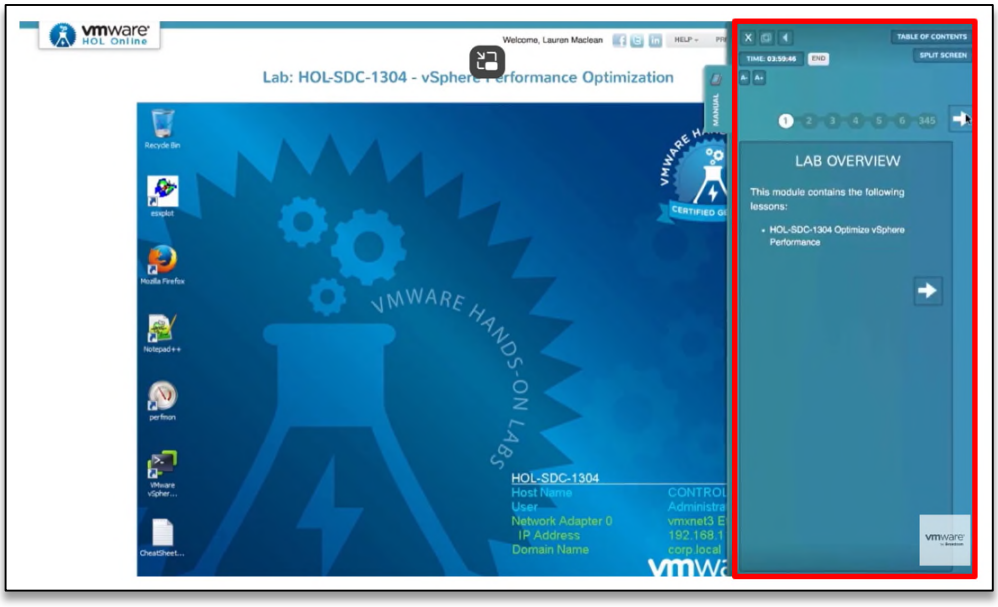


Figure 27. Screenshot from VMware YouTube video titled "What are VMware Hands-on Labs?," showing VMware Hands-on Lab Environment highlighted with in-lab manual highlighted in red.

[160] "What are VMware Hands-on Labs?," VMware YouTube Channel, YouTube.com (June 25, 2014), https://www.youtube.com/watch?v=XggYeVsK_R0, 0:25-32.

[161] *Id.*, 0:34-42.

177. Broadcom and VMware offer VMware Hands-on Labs directly related to use of NSX functionality that infringes the '102 Patent. For example, Broadcom offers a VMware Hands-on Lab on "VMware NSX – Advanced Networking (HOL-2540-02-VCF-L)," which is describes as covering "advanced configurations for experienced users, including dynamic routing, multicast, VRF, Active/Active Gateways, Multi-Tenancy, VPCs, VPNs, and NSX federation capabilities for network and security self-service." This exemplary lab has a specific module on "Multi-Tenancy with NSX Projects and Virtual Private Clouds (VPC)."

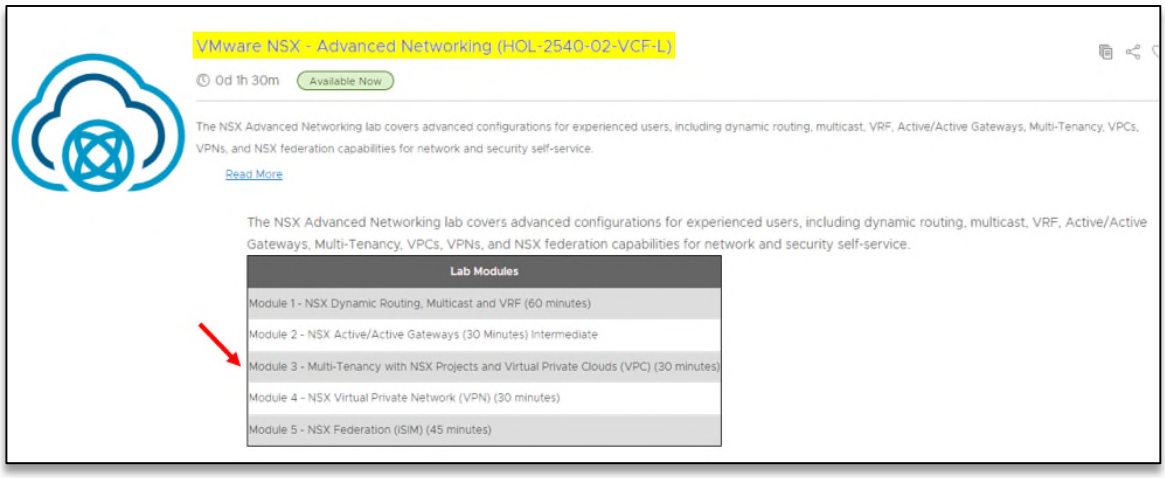


Figure 28. Screenshot from VMware Hands-on Lab Catalog for "VMware NSX – Advanced Networking (HOL-2540-02-VCF-L)" with the title highlighted in yellow and a red arrow highlighting a specific module.

178. Broadcom and VMware thus encourage their customers to infringe the '102 Patent at least by instructing customers on how to infringe by providing "manuals and built in modules" in proximity to "actual VMware products" for customers to practice infringing conduct through their VMware Hands-on Labs.

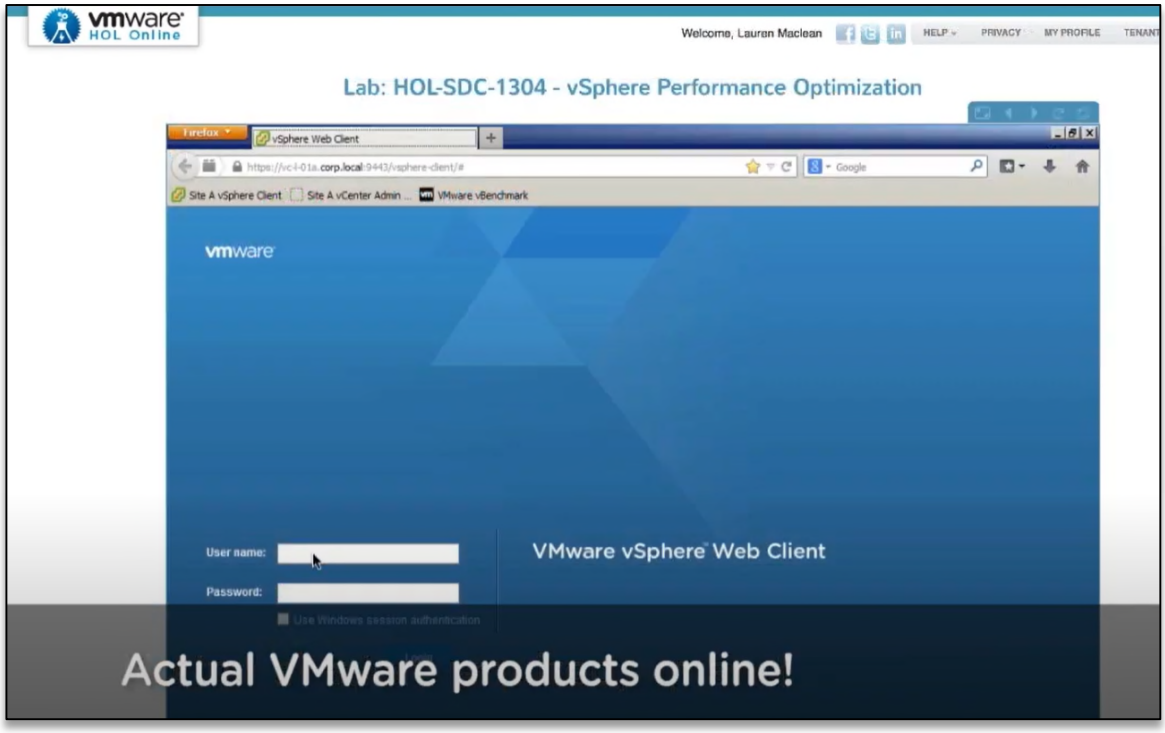


Figure 29. Screenshot from VMware YouTube video titled "What are VMware Hands-on Labs?"

179. Besides the VMware Hand-on Labs discussed above, Broadcom and VMware publicly share numerous instructions, troubleshooting manuals, and product documentations through Broadcom's support portal (https://support.broadcom.com/) and at https://docs.vmware.com/en/VMware-NSX/index.html.

180. Like the Hands-on Labs discussed above, these support documents also provide step-by-step instructions explaining how to use the Broadcom Subnet Provisioning Accused Products in an infringing manner to provision subnets in NSX.

181. Thus, Broadcom and VMware have induced their customers to infringe the '102 Patent. Broadcom and VMware's knowing inducement of their customers to infringe has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

INDIRECT INFRINGEMENT: CONTRIBUTORY INFRINGEMENT

182. Broadcom and VMware have actively contributed to infringement of at least Claim 1 of the '102 Patent in violation of at least 35 U.S.C. § 271(c). Broadcom and VMware sell the Broadcom Subnet Provisioning Accused Products which are software specially made or especially

adapted to practice the method claimed in at least Claim 1 of the '102 Patent.

183. The Broadcom Subnet Provisioning Accused Products have no substantial function or use other than to practice the invention claimed in at least Claim 1 of the '102 Patent at least because infringement of the claimed method is performed automatically when customers install the Broadcom Subnet Provisioning Accused Products on a computer system and provision a subnet.

184. The Broadcom Subnet Provisioning Accused Products are material components of the claimed method recited in at least Claim 1 of the '102 Patent and are not a staple article or commodity of commerce, including because they are specifically configured to infringe according to at least Claim 1 of the '102 Patent (*see* ¶¶ 151-167).

185. Broadcom and VMware's contributory infringements include, without limitation, making, offering to sell, and/or selling within the United States, and/or importing into the United States, the Broadcom Subnet Provisioning Accused Products, which each include one or more components for use in practicing at least Claim 1 of the '102 Patent, knowing the component to be especially made or especially adapted for use in an infringement of at least Claim 1 of the '102 Patent (*see* ¶¶ 151-183), and not a staple article or commodity of commerce suitable for substantial non-infringing use.

WILLFUL INFRINGEMENT

186. As detailed above, Broadcom and VMware had knowledge of the '102 Patent and had knowledge, or were willfully blind, as to Broadcom's and VMware's infringement of the '102 Patent.

187. Broadcom and VMware's infringement of the '102 Patent has been willful and deliberate.

188. As discussed above, Broadcom and VMware have had knowledge of the '102 Patent since at least December 23, 2024, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments by email and/or December 27, 2024 when they were served the same letter in hard-copy.

189. As discussed above, Broadcom and VMware knew or should have known that their actions constitute infringement or recklessly disregarded those facts.

190. The willfulness facts for the '472 Asserted Patents, ¶¶ 141-149, *supra*, are incorporated by reference herein.

191. Broadcom and VMware have willfully infringed the '102 Patent. Broadcom and VMware's knowing and willful infringement has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

THIRD CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,649,912 (the "'912 Patent")

192. Netflix incorporates by reference all preceding paragraphs, *supra*.

193. Broadcom has infringed and continues to infringe, at least Claims 1-3 and 5-12 of the '912 Patent, either literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale within the United States and/or importing into the United States products that are covered by at least Claims 1-3 and 5-12 of the '912 Patent. These products include but are not limited to, the BCM56070; BCM88690; BCM88860; StrataDNX devices including, but not limited to, StrataDNX 28.8 T/s StrataDNX Ethernet Switch Router Series, StrataDNX 10 Tb/s Scalable Switching Device and 440 Gb/s TSN Ethernet Switch; BroadPTP 1588 Software Suite; BroadSync firmware for enabling synchronization between BroadSync slave devices (switch chips) and BroadSync Master devices; Optical PHYs; Industrial Broad-R Reach; mGig PHYs; Gigabit PHYs; Roboswitch; StrataXGSs; 10GBASE-T PHYs; Automotive Switches, as well as any other products implementing and supporting the PTPv2 specification (collectively, "Broadcom's Switching Solutions") (collectively, the "Broadcom Switching Accused Products").

Broadcom's BCM56070	Broadcom's BCM88690	Broadcom's BCM88860
		
Key Features • Non-blocking architecture with line-rate performance • Flexible I/O that supports 1G/2.5G/5G/10G/25G/40G/50G/100G port speeds • Support for direct connect to mGig PHYs • Line-rate MACsec • VxLAN support for next-generation wireless LAN and SDN support • Support for port extender applications (eTAG, VN-Tag, HiGig™) • VRF to support isolated Layer 3 domains in a multi-tenant environment • Full IPv4 and IPv6 routing support • IEEE 1588 transparent clock and synchronized Ethernet (SyncE)	**Key Features** • Highly integrated DNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.	**Key Features** • Highly-integrated StrataDNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.

Figure 30. Exemplary Broadcom products that practice the claims of the '912 Patent.[162]

194. Claim 1 the '912 Patent recites:

> A method of synchronizing node clocks within a plurality of nodes on a network including a time master node having a master clock and including at least one time slave node, the method comprising:
>
> connecting the plurality of nodes through a full duplex Ethernet network with a daisy-chain connection of the nodes to each other;
>
> transmitting a time synchronization message frame from one of the plurality of nodes to a second one of said plurality of nodes, the

[162] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

time synchronization message frame having a timestamp field according to IEEE 1588 standard and a checksum field and a cyclic redundancy checking code;

at a given one of the plurality of nodes between the first and second nodes:

(i) receiving the time synchronization message frame;

(ii) reading a timestamp value of a timestamp field of the time synchronization message frame;

(iii) near a time of retransmission of the time synchronization message frame from the given node, adjusting the read timestamp value in the timestamp field by an amount of delay between time of reception and a time of the retransmission to produce a corrected timestamp value;

(iv) writing the corrected timestamp value over the timestamp value of the timestamp field of the time synchronization message frame;

(v) adjusting a checksum value in the checksum field and adjusting the cyclic redundancy checking code of the time synchronization message frame to account for adjusting the timestamp value; and

(vi) transmitting the time synchronization message frame from the given node; and

providing a highest priority to process and forward time synchronization message frames and lower priorities to process and forward other types of message frames.

195. The Broadcom Switching Accused Products implement a "method of synchronizing node clocks within a plurality of nodes on a network including a time master node having a master clock and including at least one time slave node."

196. The Broadcom Switching Accused Products implement a precision clock synchronization protocol for networked measurement and control systems.[163] Specifically, the Broadcom Switching Accused Products include a Boundary clock, that is a "system with multiple connections – one source port and one or more sink ports."[164] The Boundary clock system configuration is exemplified in the below figure from Broadcom's User Guide:

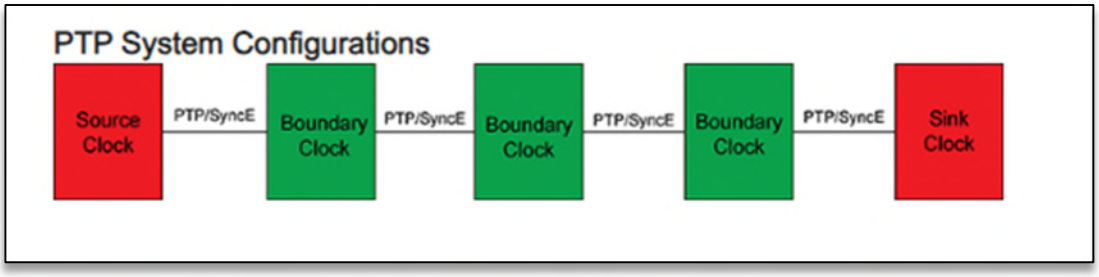


Figure 31. Graphic explaining PTP system configuration from the product user guide.

197. The Broadcom Switching Accused Products perform the step of "connecting the plurality of nodes through a full duplex Ethernet network with a daisy-chain connection of the nodes to each other."

198. The Broadcom Switching Accused Products utilize: "[a] clock synchronization protocol. This protocol is applicable to distributed systems consisting of one or more nodes, communicating over a network. . . . The protocol provides a mechanism for synchronizing the clocks of participating nodes to a high degree of accuracy and precision."[165] "Clocks communicate with each other over a network. . . . PTP works on any packet-based system. PTP is designed to work in a multicast environment, although it is possible to design unicast PTP components and systems. Ethernet is an ideal network for implementing PTP."[166] The PTP provides synchronization of one or more nodes communicating over a distributed network system (such as Ethernet network) and

[163] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[164] *Id.*

[165] IEEE Std 1588™-2008 at 16.

[166] *Id.* at 208.

may be implemented within distributed topologies, such as a daisy-chain topology.[167]

199. The Broadcom Switching Accused Products also perform the step of "transmitting a time synchronization message frame from one of the plurality of nodes to a second one of said plurality of nodes, the time synchronization message frame having a timestamp field according to IEEE 1588 standard and a checksum field and a cyclic redundancy checking code."

200. The Broadcom Switching Accused Products transmit messages "between the source clock and the sink clocks on the network."[168] These messages include Sync messages sent by the source clock to the sink clocks, containing "the current time as measured by the source clock" along "with an accurate timestamp that is generated at both the transmit time and receive time."[169]

201. In the IEEE 1588-2008 PTP standard, a "Sync message is transmitted by a master to its slaves."[170] The sync message "either contains the time of its transmission or is followed by a Follow_Up message containing this time."[171] "The message exchange pattern is as follows: a) The master sends a Sync message to the slave and notes the time t_1 at which it was sent" and "b) The slave receives the Sync message and notes the time of reception t_2."[172]

202. Once the Sync message is sent, the "<residenceTime>" is "added to the correctionField of the Sync event message by the egress port of the clock" which makes "any needed corrections to checksums or other content dependent fields of the message."[173] The Broadcom Switching Accused Products include one-step clock features including "On-the-fly egress packet

[167] *See, e.g.*, Get In Sync! IEEE1588v2 Transparent Clock Benefits for Industrial Control Distributed Networks, Microchip.com (March 22, 2012), https://ww1.microchip.com/downloads/aemDocuments/documents/OTH/ApplicationNotes/ApplicationNotes/GetinSync-WP.pdf.

[168] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[169] *Id.*

[170] IEEE Std 1588™-2008 at 42.

[171] *Id.*

[172] IEEE Std 1588™-2008 at 34.

[173] IEEE Std 1588™-2008 at 117.

modification including UDP checksum updates and CRC updates."[174] In this way, the Sync message essentially includes a timestamp field, a checksum field, and the other content dependent fields according to the IEEE 1588 standard.

203. As part of this method, the Broadcom Switching Accused Products perform steps "at a given one of the plurality of nodes between the first and second nodes" including "(i) receiving the time synchronization message frame and (ii) reading a timestamp field of the time synchronization message frame."

204. In the precision time protocol utilized by the Broadcom Switching Accused Products, a sink clock "determines the time by receiving time synchronization messages from the source clock."[175]

205. The Broadcom Switching Accused Products use a Sync message that is transmitted by a master to its slaves. The Sync message "may be used by a receiving node to measure the packet transmission delay from the master to the slave."[176] A transparent clock then generates an "ingress timestamp for all version 2 event messages [] indicating the time of receipt of the event message on the ingress port."[177] In this way, a receiving node receives the Sync message with the correctionField, and the correctionField indicates a time value in nanoseconds.

206. The Broadcom Switching Accused Products further perform the step of "(iii) near a time of retransmission of the time synchronization message frame from the given node, adjusting the read timestamp value in the timestamp field by an amount of delay between time of reception and a time of the retransmission to produce a corrected timestamp value" and the step of "iv) writing the corrected timestamp value over the timestamp value of timestamp field of the time synchronization message frame."

207. The Broadcom Switching Accused Products also feature a Transparent clock capable

[174] Broadcom BCM56072/BCM56071N Low-Power 440G Switch Data Sheet, Broadcom.com (September 28, 2020), https://docs.broadcom.com/doc/56072-56071N-DS1-PUB.

[175] *Id.*

[176] IEEE Std 1588™-2008 at 42.

[177] *Id.* at 117.

of "correct[ing] network delays to improve the accuracy of the time distribution."[178] In the Transparent clock's peer-to-peer mode, as the source sends its timestamped Sync message to the sinks, each network element along the way receives and adds the measured time delay correction to the Sync message.[179]

208. The precision time protocol utilized by the Broadcom Switching Accused Products discloses that before transmitting the Sync message, the egress port computes a residence time and adds it to the timestamp value in the correctionField of the Sync message to generate a corrected timestamp value. This correction is based on the difference in the timestamp generated when the Sync message enters and leaves the transparent clock. Specifically, the Broadcom Switching Accused Products utilize a method of residence time computation, in which the "residence time for each such event message shall be computed for each egress port" and the residence time is calculated by subtracting the ingress timestamp from the egress timestamp.[180] The Broadcom Switching Accused Products then utilize a residence time correction for Sync messages wherein the residence time is "added to the correctionField of the Sync event message by the egress port of the clock as the Sync event message is being transmitted."[181]

209. The Broadcom Switching Accused Products perform the step of "(v) adjusting a checksum value in the checksum field and adjusting the cyclic redundancy checking code of the time synchronization message frame to account for adjusting the timestamp value" and the step of "(vi) transmitting the time synchronization message frame from the given node."

210. In the Broadcom Switching Accused Products, corrections are made to checksum and other content dependent fields based on the corrected timestamp value. The PTP message frame modification includes UDP checksum updates and CRC updates. Specifically, in the Broadcom Switching Accused Products, the residence time is "added to the correctionField of the Sync event

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[178] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[179] *Id.*

[180] IEEE Std 1588™-2008 at 117.

[181] *Id.*

message by the egress port of the clock as the Sync event message is being transmitted."[182] "The egress port shall make any needed corrections to checksums or other content dependent fields of the message."[183] Further, the one-stop clock within the '912 Accused Product features "[o]n-the-fly egress packet modification including UDP checksum updates and CRC updates."[184] "All modifications to Correction Field are handled in hardware with a very short residence time."[185]

211. Finally, the Broadcom Switching Accused Products also perform the step of "providing a highest priority to process and forward time synchronization message frames and lower priorities to process and forward other types of message frames."

212. The precision time protocol utilized by the Broadcom Switching Accused Products recommends "that PTP event messages be sent in high priority compared with other data."[186] Implementations of the Broadcom Switching Accused Products' precision time protocol "must ensure that adequate computing and memory resources are available to meet these requirements. Implementations must also ensure that the resources needed by the PTP implementation have adequate priority over other applications sharing these resources to meet the PTP and servomechanism timing requirements. PTP tasks should be assigned the highest priority in an implementation, similar to priorities assigned to the protocol stack and other operating system resources."[187]

213. Accordingly, the Broadcom Switching Accused Products perform all steps of Claim 1 of the '912 Patent.

DIRECT INFRINGEMENT

214. Broadcom directly infringes the '912 Patent in multiple ways.

215. Broadcom directly infringes the '912 Patent at least when the Broadcom Switching Accused Products, automatically and by design, perform the steps of Claim 1 of the '912 Patent, in

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[182] *Id.* at 117.

[183] *Id.* at 117.

[184] Broadcom BCM56072/BCM56071N Low-Power 440G Switch Data Sheet, Broadcom.com (September 28, 2020), https://docs.broadcom.com/doc/56072-56071N-DS1-PUB.

[185] *Id.*

[186] IEEE Std 1588™-2008 at 17.

[187] *Id.* at 190.

violation of at least 35 U.S.C. § 271(a).

Figure 32. Broadcom's 440 Gb/s TSN Ethernet Switch with MACsec Encryption (BCM56070 series).[188]

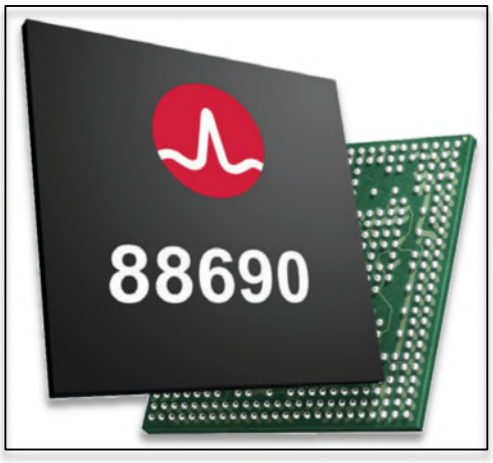

Figure 33. Broadcom's StrataDNX™ 10 Tb/s Scalable Switching Device (BCM88690).[189]

[188] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB.

[189] BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100.

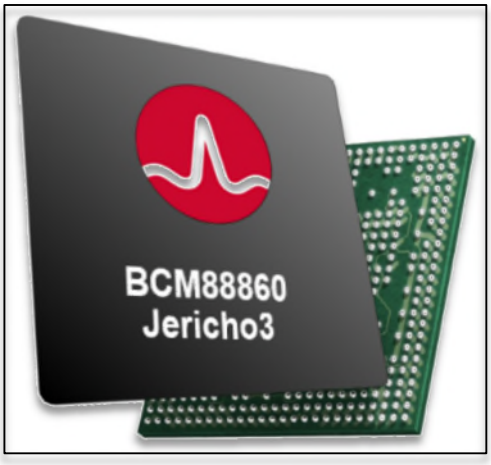

Figure 34. Broadcom's StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series (BCM88860).[190]

216. Broadcom offers to sell and sells the Broadcom Switching Accused Products on its website via a button to contact Broadcom's Sales Americas.

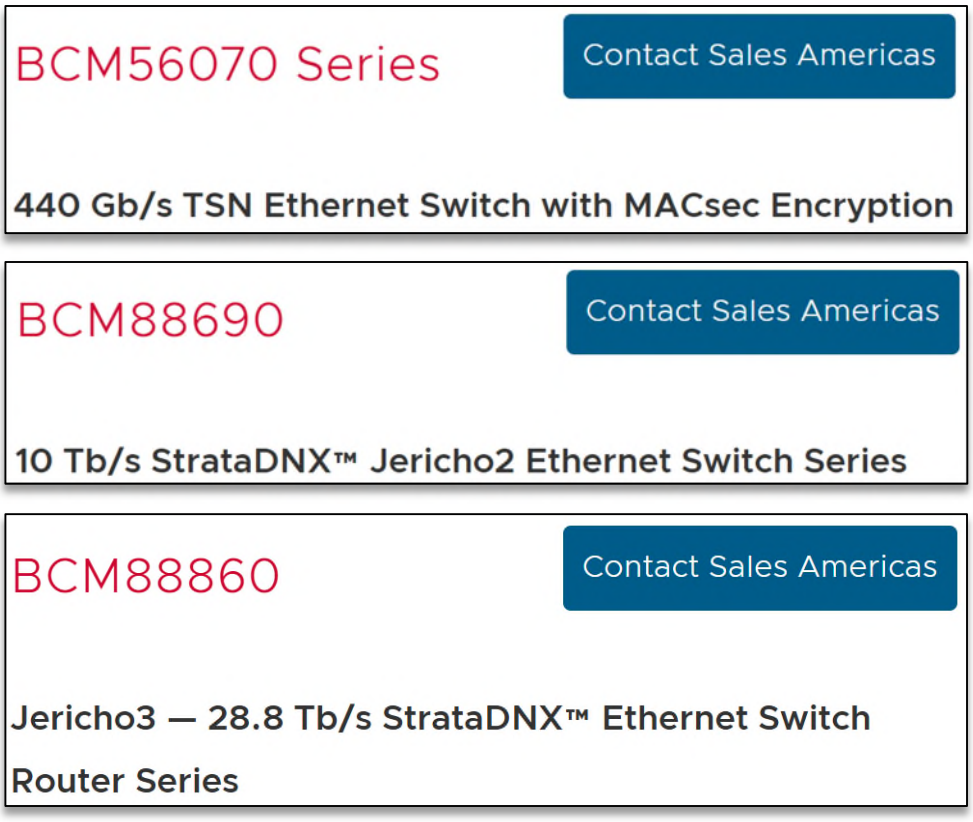

Figure 35. Broadcom offers the Broadcom Switching Accused Products for sale.[191]

[190] BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

[191] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-

217. Broadcom also directly infringes by using the claimed method to demonstrate, test, install, and configure the Broadcom Switching Accused Products for its customers.[192]

218. Accordingly, Broadcom directly infringes the '912 Patent by selling the Broadcom Switching Accused Products and by using the Broadcom Switching Accused Products for testing and demonstrating performance of the Broadcom Switching Accused Products.

INDIRECT INFRINGEMENT: INDUCEMENT

219. Broadcom has had actual knowledge of the '912 Patent and its infringement by the Broadcom Switching Accused Products since at least December 23, 2024, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments. *See* Exhibit D. That letter identified the '912 Patent, the infringing products, and a brief explanation tying an example claim to the infringing activities. *See id.* Broadcom and VMware did not respond to that letter or otherwise alter its infringing conduct.

220. Netflix sent a second notice letter to Broadcom's and VMware's Legal Departments that was served on April 15, 2025. *See* Exhibit E. Netflix reiterated in that letter that Broadcom and VMware should halt their infringing conduct with respect to the '912 Patent.

221. Broadcom and VMware are sophisticated entities who have engaged in extensive patent litigation across the country. For example, Broadcom has been involved in no less than 45 patent cases since 2002.[193] As another example, Broadcom has at least 83 IP professionals in its legal department.[194] Broadcom and VMware had ample time to review Netflix's notice of its infringing activities and deliberately chose to not respond or alter their infringing behavior.

222. Broadcom has actively induced and continues to actively induce infringement of at least Claim 1 of the '912 Patent in violation of at least 35 U.S.C. § 271(b).

PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

[192] *See, e.g.*, "10G/25G/50G/100G IEEE 1588 Optical PHY," Broadcom Inc. YouTube Channel, YouTube.com (June 2, 2021), https://www.youtube.com/watch?v=tq5cLOJ3DZY.

[193] This information was collected from the Docket Navigator research tool by searching for the party "Broadcom Inc." Notably, this estimate does not include other Broadcom entities or subsidiaries.

[194] This information was collected by searching Broadcom's LinkedIn "People" tab, using the search "intellectual property OR patent OR trademark OR copyright," and limiting to individuals listed under "Legal."

223. Broadcom's customers directly infringe at least Claim 1 of the '912 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way.

224. Broadcom has actively induced infringement of at least Claim 1 of the '912 Patent in violation of at least 35 U.S.C. § 271(b). Users of the Broadcom Switching Accused Products directly infringe at least Claim 1 of the '912 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way. Broadcom's inducement includes, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the Broadcom Switching Accused Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying the Broadcom Switching Accused Products to consumers within the United States and instructing and encouraging such customers to use the Broadcom Switching Accused Products in the ordinary, customary, and intended way, which Broadcom knows or should know infringes at least Claim 1 of the '912 Patent.

225. For example, Broadcom sells the Broadcom Switching Accused Products to its customers. When Broadcom's customers install the Broadcom Switching Accused Products and enable them for use, at least Claim 1 of the '912 Patent is performed. In at least this way, the customers of Broadcom directly infringe the '912 Patent while Broadcom knows of the '912 Patent, knows or should know that these activities infringe the '912 Patent, and specifically intends for its customers to perform these activities.

226. Broadcom instructs its customers, at least through marketing, promotional, and instructional materials, to use the infringing Accused Products, as described in detail above. Broadcom creates and distributes promotional and product literature for the Accused Products that is designed to instruct, encourage, enable, and facilitate the user of the Accused Products to use the Accused Products in a manner that directly infringes the Patent. And Broadcom provides instructions, support, and technical assistance to its customers in support of committing the infringement.

227. One nonlimiting example of Broadcom's inducement includes Broadcom's

BroadPTP 1588 Software Suite.[195] Broadcom's engineers provide specific instructions that Broadcom's BroadPTP solution can be used to implement at least Claim 1 of the '912 Patent in a variety of different use cases.[196] "BroadSync is a Broadcom software-firmware that runs on a StrataDNX/XGS internal ARM processor and it synchronizes the time-based events between a BroadSync-Master (source) and BroadSync-Slaves (sinks). . . . BroadPTP software combines a feature rich PTP stack with a highly flexible servo to provide an integrated and scalable PTP/IEEE 1588 solution."[197]

228. Broadcom encourages its customers to infringe the '912 Patent at least by instructing customers on how to infringe by providing software and "manuals and built in modules" in proximity to Broadcom products for customers to practice infringing conduct through the use of the BroadPTP and BroadSync software packages for use with Broadcom switch products.

229. Thus, Broadcom has induced its customers to infringe the '912 Patent. Broadcom's knowing inducement of its customers to infringe has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom's wrongful acts in an amount subject to proof at trial.

INDIRECT INFRINGEMENT: CONTRIBUTORY INFRINGEMENT

230. Broadcom has actively contributed to infringement of at least Claim 1 of the '912 Patent in violation of at least 35 U.S.C. § 271(c). Broadcom sells the Broadcom Switching Accused Products, which are especially adapted to practice the method claimed in at least Claim 1 of the '912 Patent.

231. The Broadcom Switching Accused Products have no substantial function or use other than to practice the invention claimed in at least Claim 1 of the '912 Patent at least because infringement of the claimed method is performed automatically when customers install and enable

[195] BroadPTP™ 1588 Software Suite, Broadcom.com https://www.broadcom.com/products/ethernet-connectivity/software/broadptp.

[196] *See, e.g.*, "High Port Density Timing Card for Next Gen Networks," Open Compute Project YouTube Channel, YouTube.com https://www.youtube.com/watch?v=lavW_621DMk&t=503s.

[197] "BroadSync™: Using your own PTP stack with Broadcom chips," ipInfusion.com (June 21, 2020), https://www.ipinfusion.com/resources/broadsync-using-your-own-ptp-stack-with-broadcom-chips/.

the Broadcom Switching Accused Products.

232. The Broadcom Switching Accused Products are material components of the claimed method recited in at least Claim 1 of the '912 Patent and are not a staple article or commodity of commerce, including because they are specifically configured to infringe according to at least Claim 1 of the '912 Patent (*see* ¶¶ 193-218).

233. Broadcom's contributory infringements include, without limitation, making, offering to sell, and/or selling within the United States, and/or importing into the United States, the Broadcom Switching Accused Products, which each include one or more components for use in practicing at least Claim 1 of the '912 Patent, knowing the component to be especially made or especially adapted for use in an infringement of at least Claim 1 of the '912 Patent (*see* ¶¶ 193-231), and not a staple article or commodity of commerce suitable for substantial non-infringing use.

WILLFUL INFRINGEMENT

234. As detailed above, Broadcom and VMware had knowledge of the '912 Patent and had knowledge, or were willfully blind, as to Broadcom's and VMware's infringement of the '912 Patent.

235. Broadcom and VMware's infringement of the '912 Patent has been willful and deliberate.

236. As discussed above, Broadcom and VMware have had knowledge of the '912 Patent since at least December 23, 2024, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments by email and/or December 27, 2024 when they were served the same letter in hard-copy.

237. As discussed above, Broadcom and VMware knew or should have known that their actions constitute infringement or recklessly disregarded those facts.

238. The willfulness facts for the '912 Asserted Patents, ¶¶ 141-149, *supra*, are incorporated by reference herein.

239. Broadcom and VMware have willfully infringed the '912 Patent. Broadcom and VMware's knowing and willful infringement has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's

wrongful acts in an amount subject to proof at trial.

FOURTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,447,931 (the "'931 Patent")

240. Netflix incorporates by reference all preceding paragraphs, *supra*.

241. Broadcom has infringed and continues to infringe, at least Claims 27-32 of the '931 Patent, either literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale within the United States and/or importing into the United States products that are covered by at least Claims 27-32 of the '931 Patent. These products include but are not limited to, the BCM56070; BCM88690; BCM88860; StrataDNX devices including, but not limited to, StrataDNX 28.8 T/s StrataDNX Ethernet Switch Router Series, StrataDNX 10 Tb/s Scalable Switching Device and 440 Gb/s TSN Ethernet Switch; BroadPTP 1588 Software Suite; BroadSync firmware for enabling synchronization between BroadSync slave devices (switch chips) and BroadSync Master devices; Optical PHYs; Industrial Broad-R Reach; mGig PHYs; Gigabit PHYs; Roboswitch; StrataXGSs; 10GBASE-T PHYs; Automotive Switches, as well as any other products implementing and supporting the PTPv2 specification (collectively, "Broadcom's Switching Solutions") (collectively, the "Broadcom Switching Accused Products").

Broadcom's BCM56070	Broadcom's BCM88690	Broadcom's BCM88860
		
Key Features • Non-blocking architecture with line-rate performance • Flexible I/O that supports 1G/2.5G/5G/10G/25G/40G/50G/100G port speeds • Support for direct connect to mGig PHYs • Line-rate MACsec • VxLAN support for next-generation wireless LAN and SDN support • Support for port extender applications (eTAG, VN-Tag, HiGig™) • VRF to support isolated Layer 3 domains in a multi-tenant environment • Full IPv4 and IPv6 routing support • IEEE 1588 transparent clock and synchronized Ethernet (SyncE)	**Key Features** • Highly integrated DNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.	**Key Features** • Highly-integrated StrataDNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.

Figure 33. Exemplary Broadcom products that practice the claims of the '931 Patent.[198]

242. Claim 27 of the '931 Patent recites:

A method for enabling node timestamp time synchronization with a master clock step change employing timestamps received at a single node, comprising:

receiving a first timestamp associated with a first offset and a second timestamp associated with a second offset;

calculating a compensated timestamp based in part of the first timestamp and associated offset and the second offset;

determining if a step change has occurred; and

selectively updating the second timestamp and associated

[198] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

second offset if a step change has occurred.

243. The Broadcom Switching Accused Products implement a "method for enabling node timestamp time synchronization with a master clock step change employing timestamps received at a single node."

244. The Broadcom Switching Accused Products implement a precision clock synchronization protocol based on an optional feature of the IEEE 1588v2 Precision Time Protocol (PTP) which "defines a packet-based time synchronization method that provides frequency, phase and time-of-day information with sub-microsecond accuracy. The IEEE 802.1AS Timing and Synchronization protocol introduces the same PTP concepts into native Ethernet. Both protocols rely on the same fundamental mechanisms, thus for the purposes of this white paper, they will be treated equivalently. *PTP relies on the use of carefully timestamped packets to synchronize one or more slave clocks to a master clock.* Synchronous time information is distributed hierarchically, with a grand master clock at the root of the hierarchy. The grand master provides the time reference for one or more slave devices. These slave devices can, in turn, act as master devices for further hierarchical layers of slave devices."[199]

245. The Broadcom Switching Accused Products implement a precision clock synchronization protocol for networked measurement and control systems.[200] The clock synchronization protocol "is applicable to distributed systems consisting of one or more nodes, communicating over a network. . . . The protocol provides a mechanism for synchronizing the clocks of participating nodes to a high degree of accuracy and precision."[201] "Clocks communicate with each other over a network. . . . PTP works on any packet-based system. PTP is designed to work in

[199] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4 (emphasis added).

[200] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[201] IEEE Std 1588™-2008 at 16.

a multicast environment, although it is possible to design unicast PTP components and systems. Ethernet is an ideal network for implementing PTP."[202] The PTP provides synchronization of one or more nodes communicating over a distributed network system (such as Ethernet network) and may be implemented within distributed topologies, such as a daisy-chain topology.[203]

246. Additionally, the Broadcom Switching Accused Products include the Broadcom Ethernet Time Synchronization functionality, which "provides a switch- and PHY-only time synchronization solution, thereby eliminating the need for an external PTP ASIC and potentially freeing up an additional Ethernet interface."[204] The Broadcom ETS solution utilizes an optional feature of the IEEE 1588-2008 PTP standard, also known as IEEE 1588v2 Precision Time Protocol ("PTP").[205] The IEEE 802.1AS Timing and Synchronization protocol also implements the same PTP concepts for Ethernet.[206]

[202] *Id.* at 208.

[203] *See, e.g.*, Get In Sync! IEEE1588v2 Transparent Clock Benefits for Industrial Control Distributed Networks, Microchip.com (March 22, 2012), https://ww1.microchip.com/downloads/aemDocuments/documents/OTH/ApplicationNotes/ApplicationNotes/GetinSync-WP.pdf.

[204] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 17.

[205] IEEE Std 1588™-2008; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

[206] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

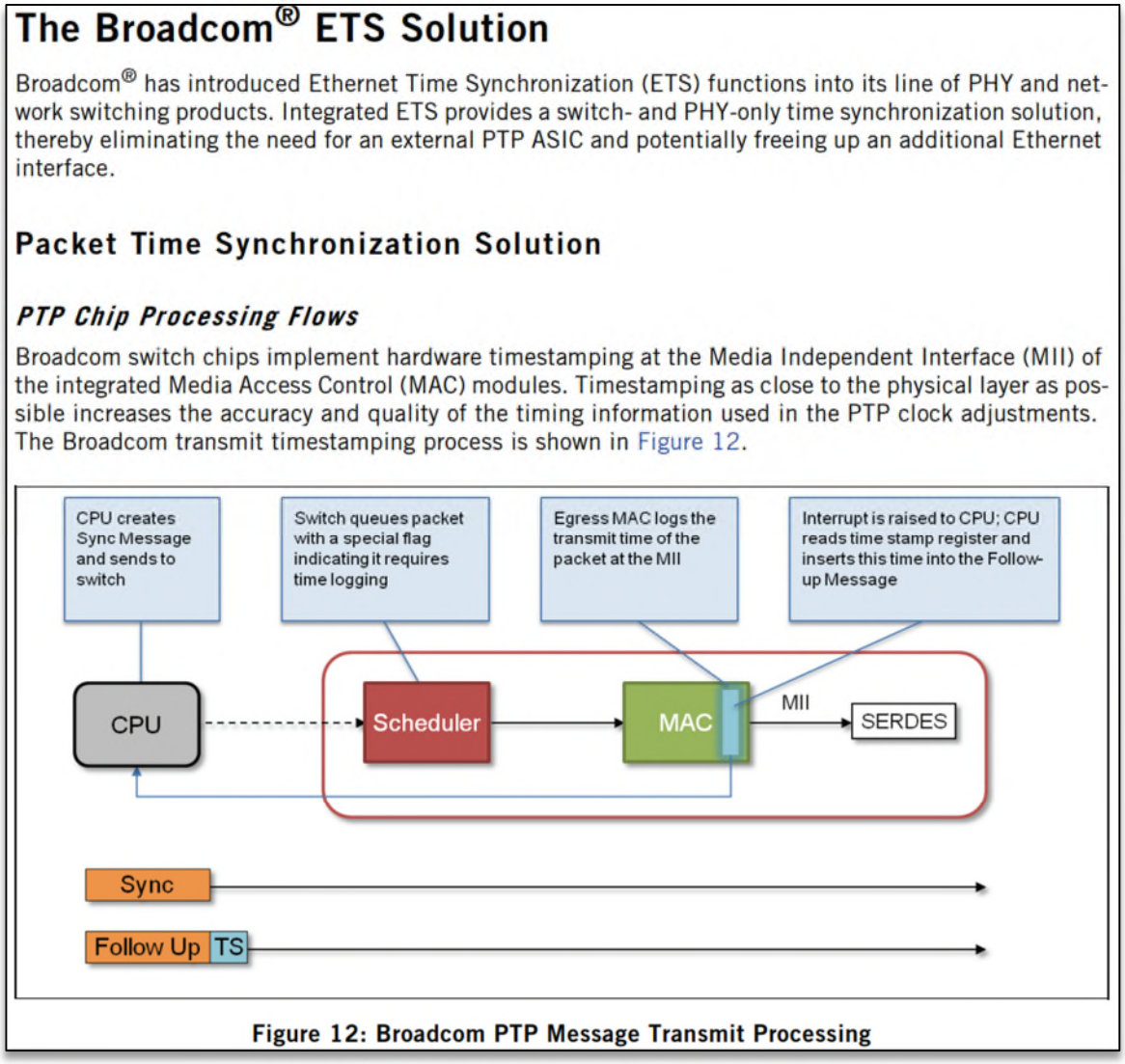

Figure 34. Explanation of Broadcom's PTP Message Transmit Processing.[207]

247. The Broadcom Switching Accused Products perform the step of "receiving a first timestamp associated with a first offset and a second timestamp associated with a second offset."

248. The Broadcom Switching Accused Products utilize the PTP Link Delay Measurement Method, which "is performed as follows: 1. The delay requester transmits a Delay Request to its link partner and *captures the timestamp of the transmission time of this packet (t1).* 2. The Delay Request message is *received by the delay responder, capturing the packet's timestamp (t2).* 3. The delay responder issues two packets in response to the preceding request: a *Delay Response message and a Delay Response Follow-Up.* a. The *Delay Response conveys the Delay*

[207] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

Request receive timestamp (t2). The delay responder *captures the transmit timestamp of this Delay Response (t3)* as it is transmitted. b. The *t3 transmit timestamp is then inserted into the Delay Response Follow-Up*. 4. The delay requester *captures the timestamp upon receipt of the Delay Response message (t4)*."[208]

249. In another example, the Broadcom Switching Accused Products receive messages "between the source clock and the sink clocks on the network."[209] These messages include Sync messages sent by the source clock to the sink clocks, containing "the current time as measured by the source clock" along "with an accurate timestamp that is generated at both the transmit time and receive time."[210]

250. In the IEEE 1588-2008 PTP standard, a "Sync message is transmitted by a master to its slaves."[211] The sync message "either contains the time of its transmission or is followed by a Follow_Up message containing this time."[212] "The message exchange pattern is as follows: a) The master sends a Sync message to the slave and notes the time t_1 at which it was sent" and "b) The slave receives the Sync message and notes the time of reception t_2."[213]

251. Once the Sync message is sent, the "<residenceTime>" is "added to the correctionField of the Sync event message by the egress port of the clock" which makes "any needed corrections to checksums or other content dependent fields of the message."[214] The Broadcom Switching Accused Products include one-step clock features including "On-the-fly egress packet modification including UDP checksum updates and CRC updates."[215] In this way, the Sync message

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[208] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5 (emphasis added).

[209] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[210] *Id.*

[211] IEEE Std 1588™-2008 at 42.

[212] *Id.*

[213] IEEE Std 1588™-2008 at 34.

[214] IEEE Std 1588™-2008 at 117.

[215] Broadcom BCM56072/BCM56071N Low-Power 440G Switch Data Sheet, Broadcom.com (September 28, 2020), https://docs.broadcom.com/doc/56072-56071N-DS1-PUB.

essentially includes a timestamp field, a checksum field, and the other content dependent fields according to the IEEE 1588 standard.

252. The Broadcom Switching Accused Products also perform the step of "calculating a compensated timestamp based in part of the first timestamp and associated offset and the second offset."

253. The Broadcom Switching Accused Products, as part of the PTP Link Delay Measurement, "[a]t the completion of the Delay Request/Response exchange, the "delay requester uses four timestamps (t1, t2, t3, t4) to compute the link delay. The link delay is computed as the average of the two one-way delays using the following formula:"[216]

$$T_{delay} = \frac{(t_2 - t_1) + (t_4 - t_3)}{2}$$

Figure 35. Broadcom's calculation of PTP Link Delay.[217]

254. In another example, the Broadcom Switching Accused Products calculate Drift Adjustment and Offset Adjustments, as shown below.[218] A Drift Adjustment is made if "the trend of slave offset values calculated from the Sync Messages continues to increase or decrease over time, the local reference clock that increments the free-running counter is operating at a rate slightly slower or faster than the master reference. A drift adjustment can be made to the freerunning counter by slightly increasing or decreasing the rate at which the counter increments. Doing so locks the frequency of the counter to the master reference (syntonization). Syntonization is the adjustment of a clock signal to match the frequency, but not necessarily the phase, of another clock signal."[219] Offset Adjustments are "applied to the local time value to synchronize the local time with the

[216] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[217] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[218] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[219] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

master's."

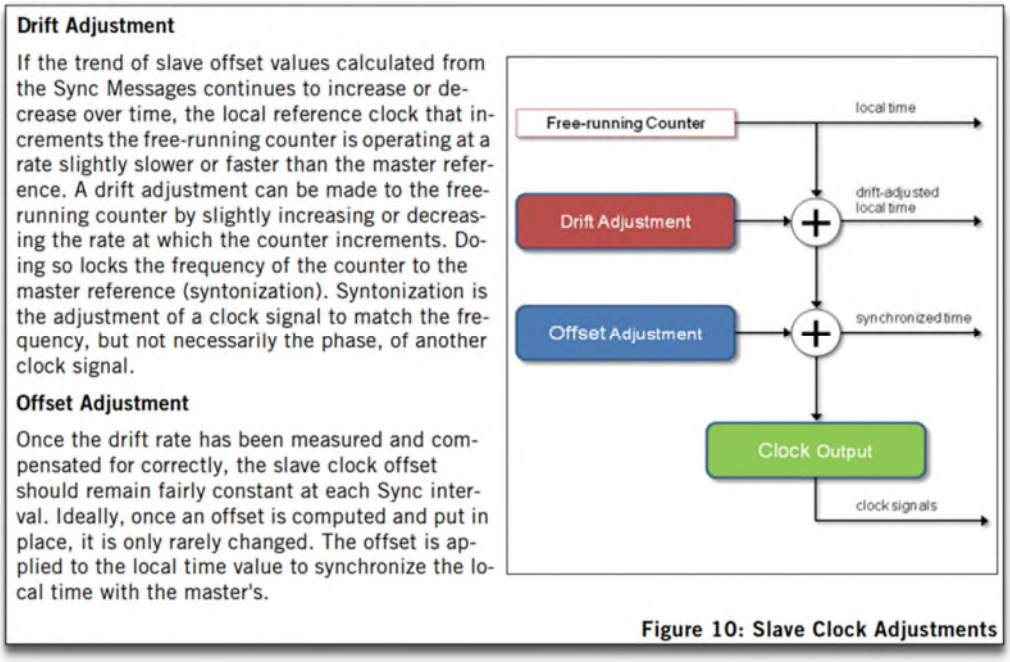


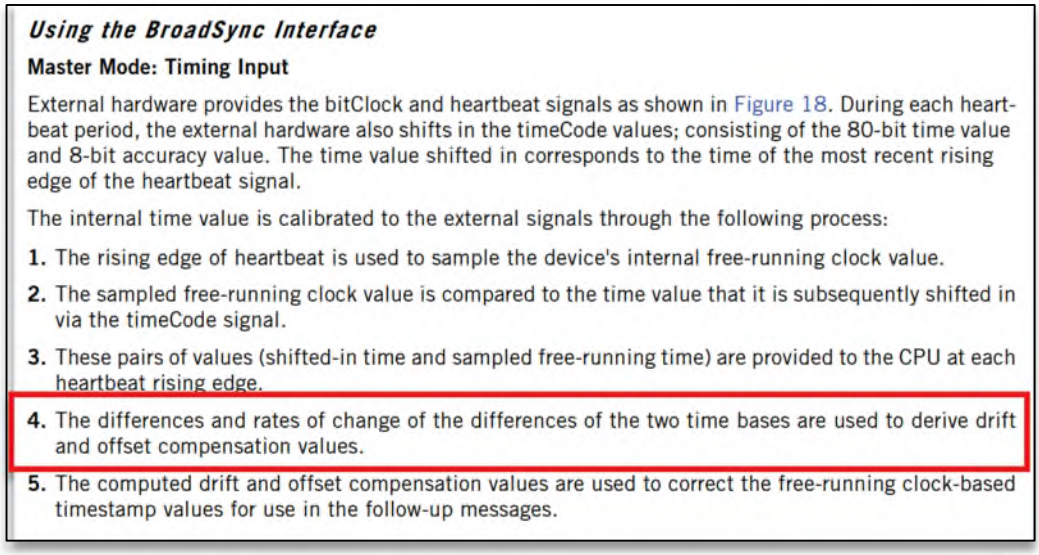
Figure 36. Describing slave clock adjustments according to Broadcom's PTP process.[220]

255. As part of this method, the Broadcom Switching Accused Products perform the step "determining if a step change has occurred."

256. For example, in the precision time protocol utilized by the Broadcom Switching Accused Products determine if a step change has occurred, as shown below.[221]

[220] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[221] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.



Using the BroadSync Interface

Master Mode: Timing Input

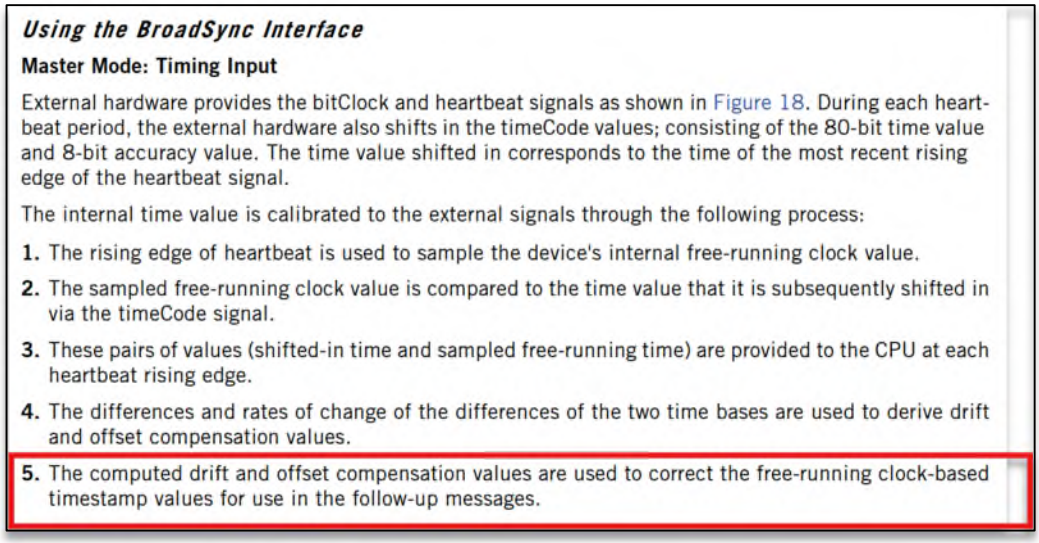
External hardware provides the bitClock and heartbeat signals as shown in Figure 18. During each heartbeat period, the external hardware also shifts in the timeCode values; consisting of the 80-bit time value and 8-bit accuracy value. The time value shifted in corresponds to the time of the most recent rising edge of the heartbeat signal.

The internal time value is calibrated to the external signals through the following process:

1. The rising edge of heartbeat is used to sample the device's internal free-running clock value.
2. The sampled free-running clock value is compared to the time value that it is subsequently shifted in via the timeCode signal.
3. These pairs of values (shifted-in time and sampled free-running time) are provided to the CPU at each heartbeat rising edge.
4. The differences and rates of change of the differences of the two time bases are used to derive drift and offset compensation values.
5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

Figure 37. Describing how drift and offset compensation values are derived.[222]

257. The Broadcom Switching Accused Products further perform the step of "selectively updating the second timestamp and associated second offset if a step change has occurred."



Using the BroadSync Interface

Master Mode: Timing Input

External hardware provides the bitClock and heartbeat signals as shown in Figure 18. During each heartbeat period, the external hardware also shifts in the timeCode values; consisting of the 80-bit time value and 8-bit accuracy value. The time value shifted in corresponds to the time of the most recent rising edge of the heartbeat signal.

The internal time value is calibrated to the external signals through the following process:

1. The rising edge of heartbeat is used to sample the device's internal free-running clock value.
2. The sampled free-running clock value is compared to the time value that it is subsequently shifted in via the timeCode signal.
3. These pairs of values (shifted-in time and sampled free-running time) are provided to the CPU at each heartbeat rising edge.
4. The differences and rates of change of the differences of the two time bases are used to derive drift and offset compensation values.
5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

Figure 38. Describing how drift and offset compensation values are used to correct timestamp values.[223]

258. The Broadcom Switching Accused Products, for example, selectively update the

[222] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[223] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

second time and global entry whether the step change occurred, as shown above.[224] The second timestamp and associate delay response follow-up are updated if the step change occurred.

259. In another example, the "host CPU configures the drift and offset adjustment registers in the GTM based on the trend of slave offset and propagation delay values it calculates from received PTP messages."[225]

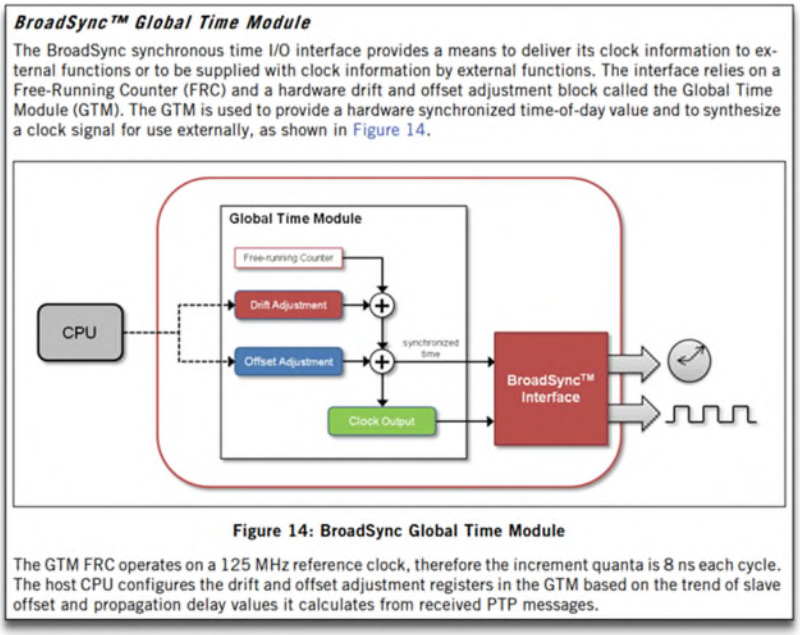


Figure 39. Describing the BroadSync Global Time Module's process to calculate drift and offset compensation values used to correct timestamp values.[226]

260. Claim 32 of the '931 Patent recites:

> A method for compensation of timestamps between a source node and a destination node, comprising:
>
> receiving at a destination node a source offset and an associated timestamp from a source node;
>
> comparing the source offset to an offset previously received

[224] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

[225] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

[226] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

at the destination node to determine a step change; and

selectively adjusting the received timestamp and associated offset based on the determined step change.

261. The Broadcom Switching Accused Products implement a "method for compensation of timestamps between a source node and a destination node."

262. The Broadcom Switching Accused Products implement a precision clock synchronization protocol based on an optional feature of the IEEE 1588v2 Precision Time Protocol (PTP) which "defines a packet-based time synchronization method that provides frequency, phase and time-of-day information with sub-microsecond accuracy. The IEEE 802.1AS Timing and Synchronization protocol introduces the same PTP concepts into native Ethernet. Both protocols rely on the same fundamental mechanisms, thus for the purposes of this white paper, they will be treated equivalently. *PTP relies on the use of carefully timestamped packets to synchronize one or more slave clocks to a master clock.* Synchronous time information is distributed hierarchically, with a grand master clock at the root of the hierarchy. *The grand master provides the time reference for one or more slave devices. These slave devices can, in turn, act as master devices for further hierarchical layers of slave devices.*"[227]

263. The Broadcom Switching Accused Products implement a precision clock synchronization protocol for networked measurement and control systems.[228] The clock synchronization protocol "is applicable to distributed systems consisting of one or more nodes, communicating over a network. . . . The protocol provides a mechanism for synchronizing the clocks of participating nodes to a high degree of accuracy and precision."[229] "Clocks communicate with

[227] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4 (emphasis added).

[228] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[229] IEEE Std 1588™-2008 at 16.

each other over a network. . . . PTP works on any packet-based system. PTP is designed to work in a multicast environment, although it is possible to design unicast PTP components and systems. Ethernet is an ideal network for implementing PTP."[230] The PTP provides synchronization of one or more nodes communicating over a distributed network system (such as Ethernet network) and may be implemented within distributed topologies, such as a daisy-chain topology.[231]

264. Additionally, the Broadcom Switching Accused Products include the Broadcom Ethernet Time Synchronization functionality, which "provides a switch- and PHY-only time synchronization solution, thereby eliminating the need for an external PTP ASIC and potentially freeing up an additional Ethernet interface."[232] The Broadcom ETS solution utilizes an optional feature of the IEEE 1588-2008 PTP standard, also known as IEEE 1588v2 Precision Time Protocol ("PTP").[233] The IEEE 802.1AS Timing and Synchronization protocol also implements the same PTP concepts for Ethernet.[234]

[230] *Id.* at 208.

[231] *See, e.g.*, Get In Sync! IEEE1588v2 Transparent Clock Benefits for Industrial Control Distributed Networks, Microchip.com (March 22, 2012), https://ww1.microchip.com/downloads/aemDocuments/documents/OTH/ApplicationNotes/ApplicationNotes/GetinSync-WP.pdf.

[232] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 17.

[233] IEEE Std 1588™-2008; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

[234] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

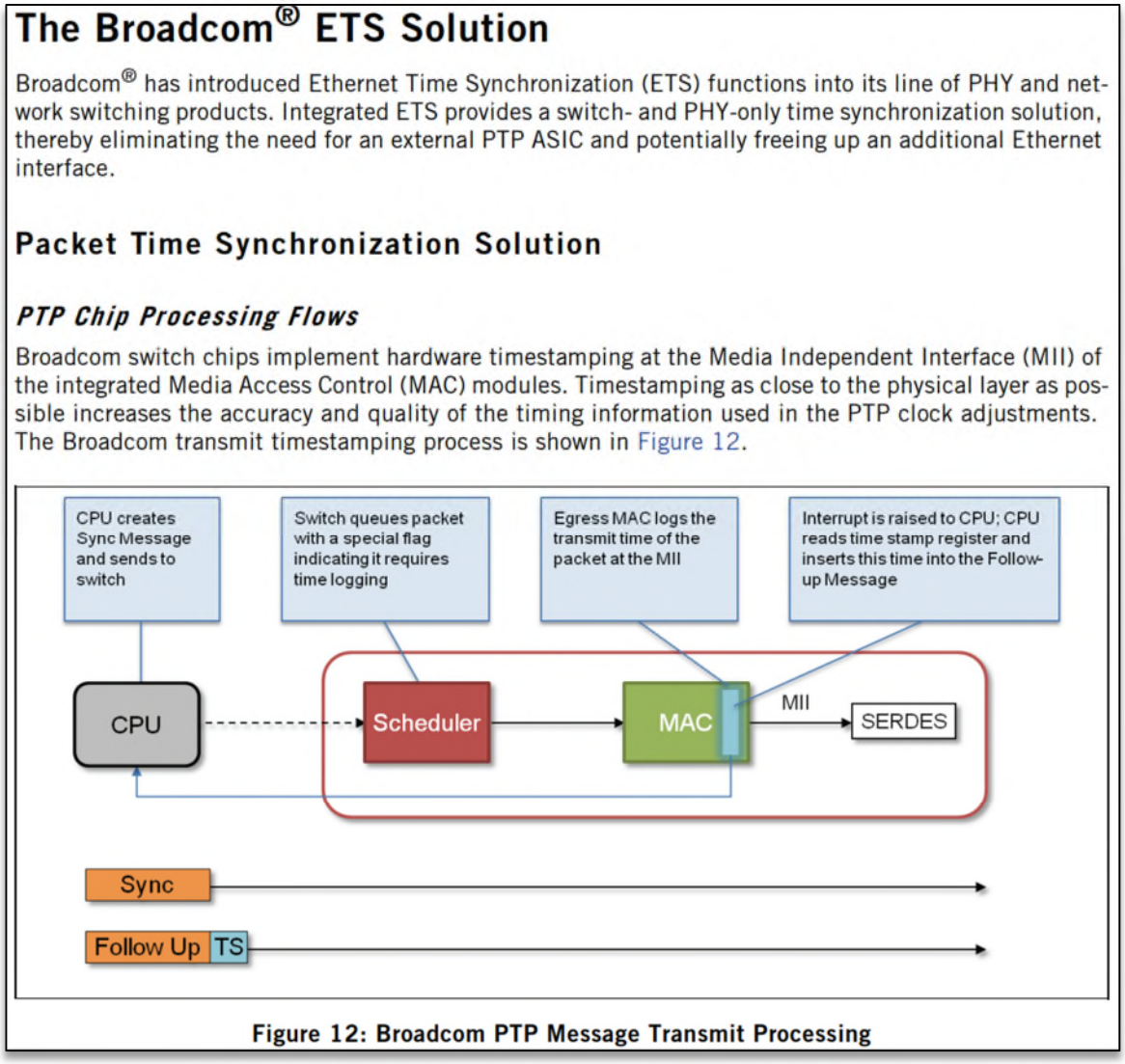


Figure 40. Explanation of Broadcom's PTP Message Transmit Processing.[235]

265. The Broadcom Switching Accused Products perform the step of "receiving at a destination node a source offset and an associated timestamp from a source node."

266. The Broadcom Switching Accused Products utilize the PTP Link Delay Measurement Method, which "is performed as follows: 1. The delay requester transmits a Delay Request to its link partner and *captures the timestamp of the transmission time of this packet (t1).* 2. The Delay Request message is *received by the delay responder, capturing the packet's timestamp (t2).* 3. The delay responder issues two packets in response to the preceding request: a *Delay Response message and a Delay Response Follow-Up.* a. The *Delay Response conveys the Delay*

[235] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

Request receive timestamp (t2). The delay responder *captures the transmit timestamp of this Delay Response (t3)* as it is transmitted. b. The *t3 transmit timestamp is then inserted into the Delay Response Follow-Up*. 4. The delay requester *captures the timestamp upon receipt of the Delay Response message (t4)*."[236]

267. In another example, the Broadcom Switching Accused Products receive messages "between the source clock and the sink clocks on the network."[237] These messages include Sync messages sent by the source clock to the sink clocks, containing "the current time as measured by the source clock" along "with an accurate timestamp that is generated at both the transmit time and receive time."[238]

268. In the IEEE 1588-2008 PTP standard, a "Sync message is transmitted by a master to its slaves."[239] The sync message "either contains the time of its transmission or is followed by a Follow_Up message containing this time."[240] "The message exchange pattern is as follows: a) The master sends a Sync message to the slave and notes the time t_1 at which it was sent" and "b) The slave receives the Sync message and notes the time of reception t_2."[241]

269. Once the Sync message is sent, the "<residenceTime>" is "added to the correctionField of the Sync event message by the egress port of the clock" which makes "any needed corrections to checksums or other content dependent fields of the message."[242] The Broadcom Switching Accused Products include one-step clock features including "On-the-fly egress packet modification including UDP checksum updates and CRC updates."[243] In this way, the Sync message

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[236] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5 (emphasis added).

[237] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[238] *Id.*

[239] IEEE Std 1588™-2008 at 42.

[240] *Id.*

[241] IEEE Std 1588™-2008 at 34.

[242] IEEE Std 1588™-2008 at 117.

[243] Broadcom BCM56072/BCM56071N Low-Power 440G Switch Data Sheet, Broadcom.com (September 28, 2020), https://docs.broadcom.com/doc/56072-56071N-DS1-PUB.

essentially includes a timestamp field, a checksum field, and the other content dependent fields according to the IEEE 1588 standard.

270. The Broadcom Switching Accused Products also perform the step of "comparing the source offset to an offset previously received at the destination node to determine a step change."

271. The Broadcom Switching Accused Products, as part of the PTP Link Delay Measurement, "[a]t the completion of the Delay Request/Response exchange, the "delay requester uses four timestamps (t1, t2, t3, t4) to compute the link delay. The link delay is computed as the average of the two one-way delays using the following formula:"[244]

$$T_{delay} = \frac{(t_2 - t_1) + (t_4 - t_3)}{2}$$

Figure 41. Broadcom's calculation of PTP Link Delay.[245]

272. In another example, the Broadcom Switching Accused Products calculate Drift Adjustment and Offset Adjustments, as shown below.[246] A Drift Adjustment is made if "the trend of slave offset values calculated from the Sync Messages continues to increase or decrease over time, the local reference clock that increments the free-running counter is operating at a rate slightly slower or faster than the master reference. A drift adjustment can be made to the freerunning counter by slightly increasing or decreasing the rate at which the counter increments. Doing so locks the frequency of the counter to the master reference (syntonization). Syntonization is the adjustment of a clock signal to match the frequency, but not necessarily the phase, of another clock signal."[247] Offset Adjustments are "applied to the local time value to synchronize the local time with the master's."

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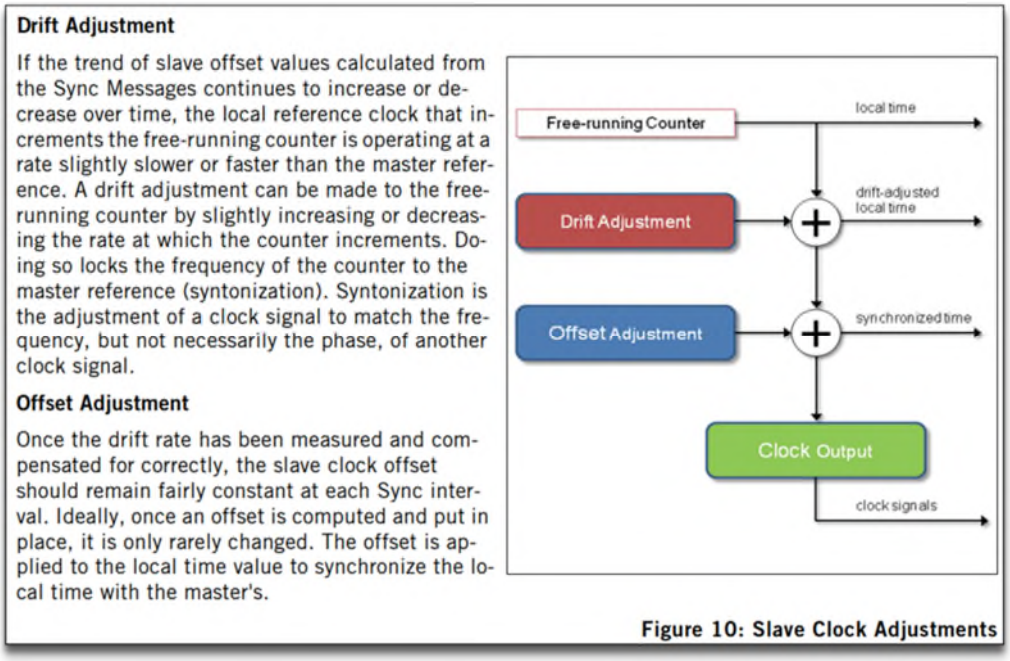
[244] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[245] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[246] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[247] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.



Drift Adjustment

If the trend of slave offset values calculated from the Sync Messages continues to increase or decrease over time, the local reference clock that increments the free-running counter is operating at a rate slightly slower or faster than the master reference. A drift adjustment can be made to the free-running counter by slightly increasing or decreasing the rate at which the counter increments. Doing so locks the frequency of the counter to the master reference (syntonization). Syntonization is the adjustment of a clock signal to match the frequency, but not necessarily the phase, of another clock signal.

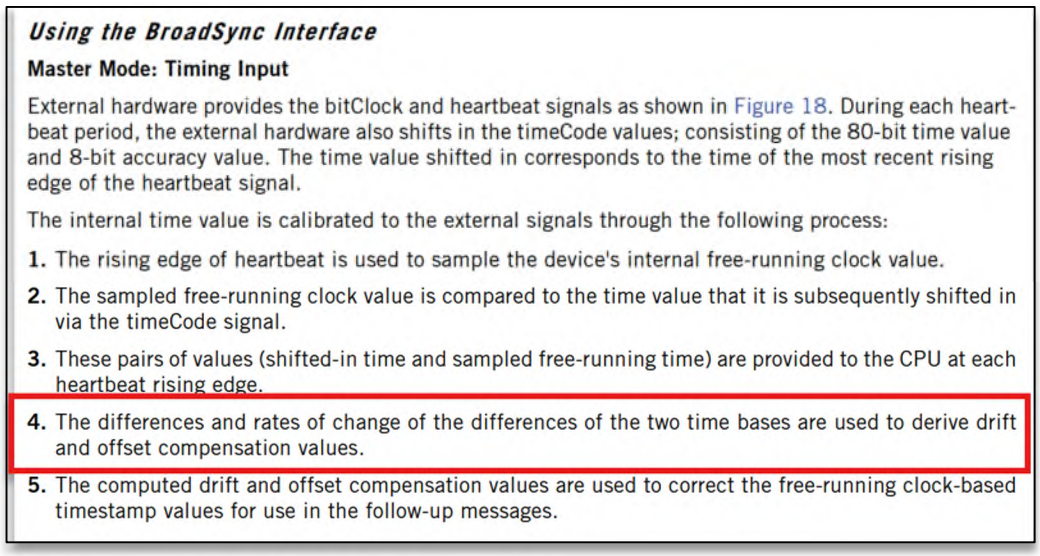
Offset Adjustment

Once the drift rate has been measured and compensated for correctly, the slave clock offset should remain fairly constant at each Sync interval. Ideally, once an offset is computed and put in place, it is only rarely changed. The offset is applied to the local time value to synchronize the local time with the master's.

Figure 10: Slave Clock Adjustments

Figure 42. Describing slave clock adjustments according to Broadcom's PTP process.[248]

273. For example, the precision time protocol utilized by the Broadcom Switching Accused Products compares differences in rates of change and time bases to determine if a step change has occurred, as shown below.[249]



Using the BroadSync Interface

Master Mode: Timing Input

External hardware provides the bitClock and heartbeat signals as shown in Figure 18. During each heartbeat period, the external hardware also shifts in the timeCode values; consisting of the 80-bit time value and 8-bit accuracy value. The time value shifted in corresponds to the time of the most recent rising edge of the heartbeat signal.

The internal time value is calibrated to the external signals through the following process:

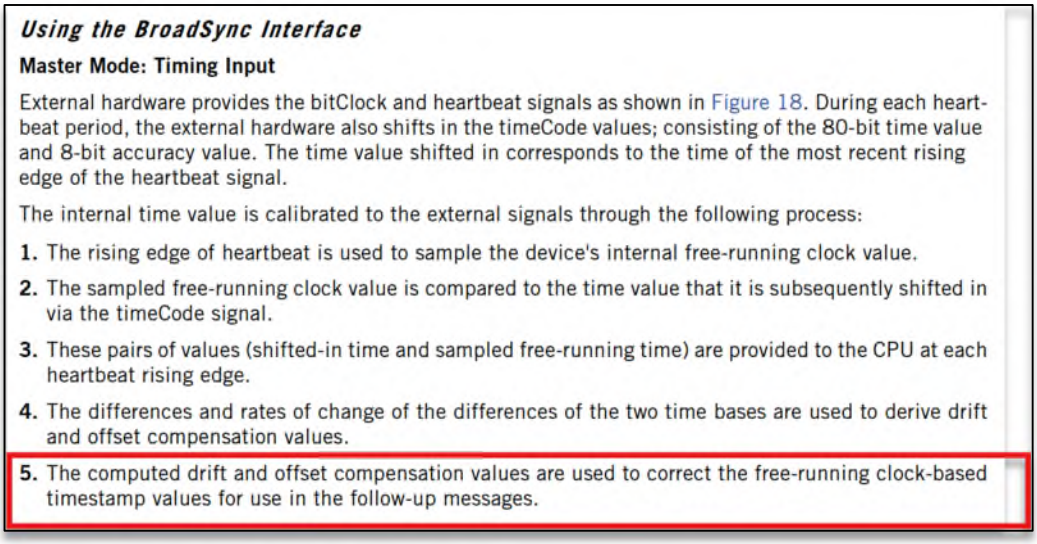
1. The rising edge of heartbeat is used to sample the device's internal free-running clock value.
2. The sampled free-running clock value is compared to the time value that it is subsequently shifted in via the timeCode signal.
3. These pairs of values (shifted-in time and sampled free-running time) are provided to the CPU at each heartbeat rising edge.
4. The differences and rates of change of the differences of the two time bases are used to derive drift and offset compensation values.
5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

[248] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[249] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

Figure 43. Describing how drift and offset compensation values are derived.[250]

274. The Broadcom Switching Accused Products further perform the step of "selectively adjusting the received timestamp and associated offset based on the determined step change."



Using the BroadSync Interface

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External hardware provides the bitClock and heartbeat signals as shown in Figure 18. During each heartbeat period, the external hardware also shifts in the timeCode values; consisting of the 80-bit time value and 8-bit accuracy value. The time value shifted in corresponds to the time of the most recent rising edge of the heartbeat signal.

The internal time value is calibrated to the external signals through the following process:

1. The rising edge of heartbeat is used to sample the device's internal free-running clock value.
2. The sampled free-running clock value is compared to the time value that it is subsequently shifted in via the timeCode signal.
3. These pairs of values (shifted-in time and sampled free-running time) are provided to the CPU at each heartbeat rising edge.
4. The differences and rates of change of the differences of the two time bases are used to derive drift and offset compensation values.
5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

Figure 44. Describing how drift and offset compensation values are used to correct timestamp values.[251]

275. The Broadcom Switching Accused Products, for example, selectively update the second time and offset depending on whether the step change occurred, as shown above.[252] The second timestamp and associate delay response follow-up are updated if the step change occurred.

276. In another example, the "host CPU configures the drift and offset adjustment registers in the GTM based on the trend of slave offset and propagation delay values it calculates from received PTP messages.[253]

[250] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[251] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[252] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

[253] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

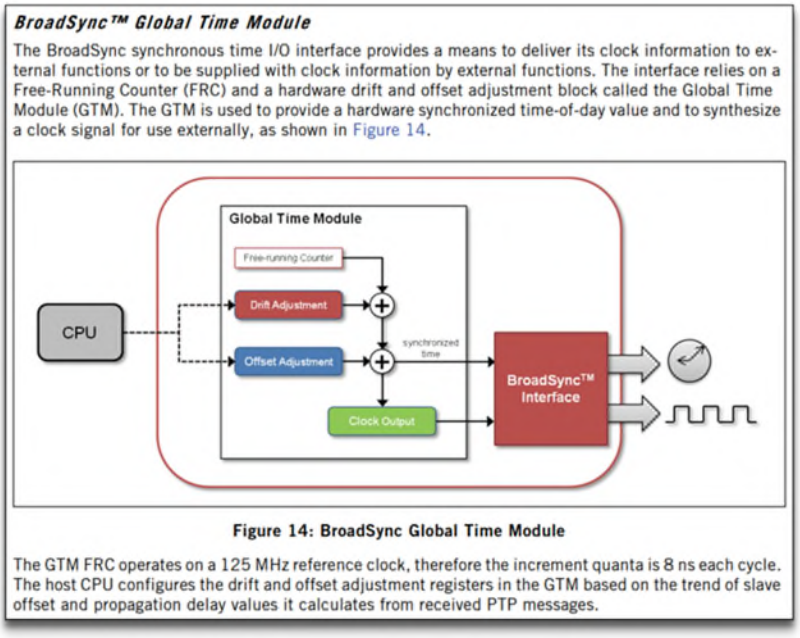

Figure 45. Describing the BroadSync Global Time Module's process to calculate drift and offset compensation values used to correct timestamp values.[254]

277. Accordingly, the Broadcom Switching Accused Products perform all steps of Claims 27 and 32 of the '931 Patent.

DIRECT INFRINGEMENT

278. Broadcom directly infringes the '931 Patent in multiple ways.

279. Broadcom directly infringes the '931 Patent at least when the Broadcom Switching Accused Products, automatically and by design, perform the steps of at least at least Claims 27-32 of the '931 Patent, in violation of at least 35 U.S.C. § 271(a).

[254] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

Figure 46. Broadcom's 440 Gb/s TSN Ethernet Switch with MACsec Encryption (BCM56070 series).[255]

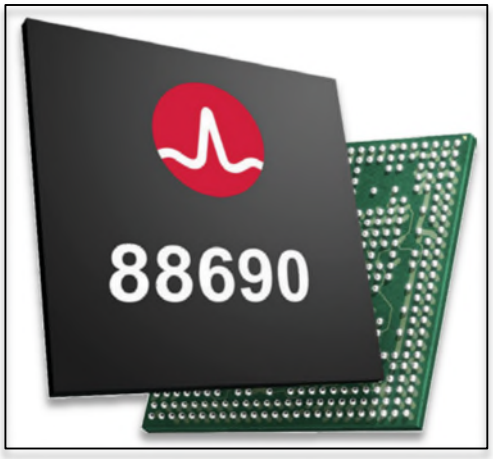

Figure 47. Broadcom's StrataDNX™ 10 Tb/s Scalable Switching Device (BCM88690).[256]

[255] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB.

[256] BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100.

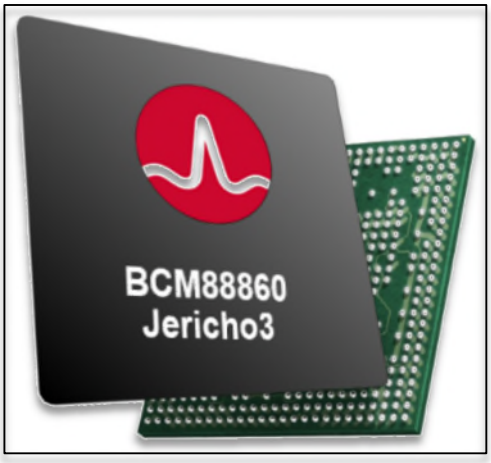

Figure 48. Broadcom's StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series (BCM88860).[257]

280. Broadcom offers to sell and sells the Broadcom Switching Accused Products on its website via a button to contact Broadcom's Sales Americas.

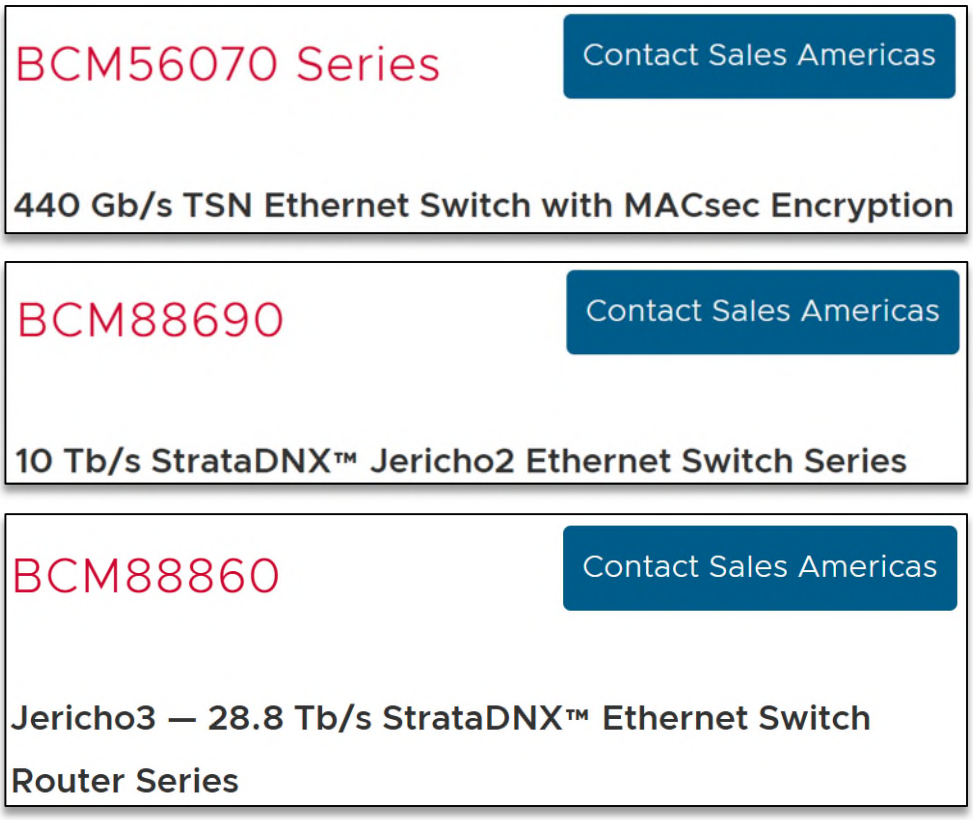

Figure 49. Broadcom offers the Broadcom Switching Accused Products for sale.[258]

[257] BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

[258] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

281. Broadcom also directly infringes by using the claimed method to demonstrate, test, install, and configure the Broadcom Switching Accused Products for its customers.[259]

282. Accordingly, Broadcom directly infringes the ’931 Patent by selling the Broadcom Switching Accused Products and by using the Broadcom Switching Accused Products for testing and demonstrating performance of the Broadcom Switching Accused Products.

INDIRECT INFRINGEMENT: INDUCEMENT

283. Broadcom has had actual knowledge of the ’931 Patent and its infringement by the Broadcom Switching Accused Products since at least April 15, 2025, when Netflix served a notice letter to Broadcom’s and VMware’s Legal Departments.

284. On December 23, 2024, Netflix sent a notice letter to Broadcom’s and VMware’s Legal Departments by email and on December 27, 2024 the same letter was served in hard-copy. *See* Exhibit D. That letter identified, for example, the ’912 Patent, the infringing products associated with the ’912 Patent, and a brief explanation tying an example claim of the ’912 Patent to infringing activities. *See id.* Broadcom and VMware did not respond to that letter or otherwise alter its infringing conduct with respect to the ’912 Patent.

285. Netflix sent a second notice letter to Broadcom’s and VMware’s Legal Departments that was served on April 15, 2025. *See* Exhibit E. Netflix reiterated in that letter that Broadcom and VMware should halt their infringing conduct with respect to the ’912 Patent but also identified the ’931 Patent. In addition to identifying the ’931 Patent, that letter identified the infringing products associated with the ’931 Patent and included a brief explanation tying an example claim of the ’931 Patent to the infringing activities. Importantly, products identified with respect to the ’912 Patent are the same as those identified in the second letter with respect to the ’931 Patent and the accused functionality is similar. *See* Exhibits D and E.

286. Broadcom and VMware are sophisticated entities who have engaged in extensive patent litigation across the country. For example, Broadcom has been involved in no less than 45

[259] *See, e.g.*, “10G/25G/50G/100G IEEE 1588 Optical PHY,” Broadcom Inc. YouTube Channel, YouTube.com (June 2, 2021), https://www.youtube.com/watch?v=tq5cLOJ3DZY.

patent cases since 2002.[260] As another example, Broadcom has at least 83 IP professionals in its legal department.[261] Broadcom and VMware had ample time to review Netflix's notice of its infringing activities—especially given that the '931 Patent shares the same accused products and similar infringing functionality as the earlier noticed '912 Patent—and deliberately chose to not respond or alter their infringing behavior.

287. Broadcom has actively induced and continues to actively induce infringement of at least Claims 27-32 of the '931 Patent in violation of at least 35 U.S.C. § 271(b).

288. Broadcom's customers directly infringe at least Claims 27-32 of the '931 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way.

289. Broadcom has actively induced infringement of at least Claims 27-32 of the '931 Patent in violation of at least 35 U.S.C. § 271(b). Users of the Broadcom Switching Accused Products directly infringe at least Claims 27-32 of the '931 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way. Broadcom's inducement includes, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the Broadcom Switching Accused Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying the Broadcom Switching Accused Products to consumers within the United States and instructing and encouraging such customers to use the Broadcom Switching Accused Products in the ordinary, customary, and intended way, which Broadcom knows or should know infringes at least Claims 27-32 of the '931 Patent.

290. For example, Broadcom sells the Broadcom Switching Accused Products to its customers. When Broadcom's customers install the Broadcom Switching Accused Products and enable them for use, at least Claims 27-32 of the '931 Patent is performed. In at least this way, the

[260] This information was collected from the Docket Navigator research tool by searching for the party "Broadcom Inc." Notably, this estimate does not include other Broadcom entities or subsidiaries.

[261] This information was collected by searching Broadcom's LinkedIn "People" tab, using the search "intellectual property OR patent OR trademark OR copyright," and limiting to individuals listed under "Legal."

customers of Broadcom directly infringe the '931 Patent while Broadcom knows of the '931 Patent, knows or should know that these activities infringe the '931 Patent, and specifically intends for its customers to perform these activities.

291. Broadcom instructs its customers, at least through marketing, promotional, and instructional materials, to use the infringing Accused Products, as described in detail above. Broadcom creates and distributes promotional and product literature for the Accused Products that is designed to instruct, encourage, enable, and facilitate the user of the Accused Products to use the Accused Products in a manner that directly infringes the Patent. And Broadcom provides instructions, support, and technical assistance to its customers in support of committing the infringement.

292. One nonlimiting example of Broadcom's inducement includes Broadcom's BroadPTP 1588 Software Suite.[262] Broadcom's engineers provide specific instructions that Broadcom's BroadPTP solution can be used to implement at least Claims 27-32 of the '931 Patent in a variety of different use cases.[263] "BroadSync is a Broadcom software-firmware that runs on a StrataDNX/XGS internal ARM processor and it synchronizes the time-based events between a BroadSync-Master (source) and BroadSync-Slaves (sinks). . . . BroadPTP software combines a feature rich PTP stack with a highly flexible servo to provide an integrated and scalable PTP/IEEE 1588 solution."[264]

293. Broadcom encourages its customers to infringe the '931 Patent at least by instructing customers on how to infringe by providing software and "manuals and built in modules" in proximity to Broadcom products for customers to practice infringing conduct through the use of the BroadPTP and BroadSync software packages for use with Broadcom switch products.

294. Thus, Broadcom has induced its customers to infringe the '931 Patent. Broadcom's

[262] BroadPTP™ 1588 Software Suite, Broadcom.com https://www.broadcom.com/products/ethernet-connectivity/software/broadptp.

[263] *See, e.g.*, "High Port Density Timing Card for Next Gen Networks," Open Compute Project YouTube Channel, YouTube.com https://www.youtube.com/watch?v=lavW_621DMk&t=503s.

[264] "BroadSync™: Using your own PTP stack with Broadcom chips," ipInfusion.com (June 21, 2020), https://www.ipinfusion.com/resources/broadsync-using-your-own-ptp-stack-with-broadcom-chips/.

knowing inducement of its customers to infringe has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom's wrongful acts in an amount subject to proof at trial.

INDIRECT INFRINGEMENT: CONTRIBUTORY INFRINGEMENT

295. Broadcom has actively contributed to infringement of at least Claims 27-32 of the '931 Patent in violation of at least 35 U.S.C. § 271(c). Broadcom sells the Broadcom Switching Accused Products, which are especially adapted to practice the method claimed in at least Claims 27-32 of the '931 Patent.

296. The Broadcom Switching Accused Products have no substantial function or use other than to practice the invention claimed in at least Claims 27-32 of the '931 Patent at least because infringement of the claimed method is performed automatically when customers install and enable the Broadcom Switching Accused Products.

297. The Broadcom Switching Accused Products are material components of the claimed method recited in at least Claims 27-32 of the '931 Patent and are not a staple article or commodity of commerce, including because they are specifically configured to infringe according to at least Claims 27-32 of the '931 Patent (*see* ¶¶ 241-282).

298. Broadcom's contributory infringements include, without limitation, making, offering to sell, and/or selling within the United States, and/or importing into the United States, the Broadcom Switching Accused Products, which each include one or more components for use in practicing at least Claims 27-32 of the '931 Patent, knowing the component to be especially made or especially adapted for use in an infringement of at least Claims 27-32 of the '931 Patent (*see* ¶¶ 241-296), and not a staple article or commodity of commerce suitable for substantial non-infringing use.

WILLFUL INFRINGEMENT

299. As detailed above, Broadcom and VMware had knowledge of the '931 Patent and had knowledge, or were willfully blind, as to Broadcom's and VMware's infringement of the '931 Patent.

300. Broadcom and VMware's infringement of the '931 Patent has been willful and

deliberate.

301. As discussed above, Broadcom and VMware have had knowledge of the '931 Patent since at least April 15, 2025, when Netflix sent a notice letter to Broadcom's and VMware's Legal Departments.

302. As discussed above, Broadcom and VMware knew or should have known that their actions constitute infringement or recklessly disregarded those facts.

303. The willfulness facts for the '931 Asserted Patents, ¶¶ 141-149, *supra*, are incorporated by reference herein.

304. Broadcom and VMware have willfully infringed the '931 Patent. Broadcom and VMware's knowing and willful infringement has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

FIFTH CLAIM FOR RELIEF

Infringement of U.S. Patent No. 7,656,751 (the "'751 Patent")

305. Netflix incorporates by reference all preceding paragraphs, *supra*.

306. Broadcom has infringed and continues to infringe, at least Claims 1-14 of the '751 Patent, either literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale within the United States and/or importing into the United States products that are covered by at least Claims 1-14 of the '751 Patent. These products include but are not limited to, the BCM56070; BCM88690; BCM88860; StrataDNX devices including, but not limited to, StrataDNX 28.8 T/s StrataDNX Ethernet Switch Router Series, StrataDNX 10 Tb/s Scalable Switching Device and 440 Gb/s TSN Ethernet Switch; BroadPTP 1588 Software Suite; BroadSync firmware for enabling synchronization between BroadSync slave devices (switch chips) and BroadSync Master devices; Optical PHYs; Industrial Broad-R Reach; mGig PHYs; Gigabit PHYs; Roboswitch; StrataXGSs; 10GBASE-T PHYs; Automotive Switches, as well as any other products implementing and supporting the PTPv2 specification (collectively, "Broadcom's Switching Solutions") (collectively, the "Broadcom Switching Accused Products").

Broadcom's BCM56070	Broadcom's BCM88690	Broadcom's BCM88860
		
Key Features • Non-blocking architecture with line-rate performance • Flexible I/O that supports 1G/2.5G/5G/10G/25G/40G/50G/100G port speeds • Support for direct connect to mGig PHYs • Line-rate MACsec • VxLAN support for next-generation wireless LAN and SDN support • Support for port extender applications (eTAG, VN-Tag, HiGig™) • VRF to support isolated Layer 3 domains in a multi-tenant environment • Full IPv4 and IPv6 routing support • IEEE 1588 transparent clock and synchronized Ethernet (SyncE)	**Key Features** • Highly integrated DNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.	**Key Features** • Highly-integrated StrataDNX scalable switching and routing device. • Highly scalable, field-proven StrataDNX traffic manager, with deep packet buffers. • Advanced and programmable packet processor, with built-in support for data center and carrier applications. • Hardware support for IEEE 1588v2 and SyncE implementations with nanosecond-scale time stamping. • Large on-chip tables with off-chip expandability.

Figure 50. Exemplary Broadcom products that practice the claims of the '751 Patent.[265]

307. Claim 1 the '751 Patent recites:

> A system that enables time synchronization, comprising:
>
> a timestamp component that captures timestamps and offsets from at least one network node; and
>
> a time synch component that identifies step changes to at least one master clock and synchronizes a local clock time of the at least one network node with the identified step change.

308. The Broadcom Switching Accused Products implement a "system that enables time synchronization."

309. The Broadcom Switching Accused Products implement a precision clock

[265] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

synchronization protocol based on an optional feature of the IEEE 1588v2 Precision Time Protocol (PTP) which "defines a packet-based time synchronization method that provides frequency, phase and time-of-day information with sub-microsecond accuracy. The IEEE 802.1AS Timing and Synchronization protocol introduces the same PTP concepts into native Ethernet. Both protocols rely on the same fundamental mechanisms, thus for the purposes of this white paper, they will be treated equivalently. *PTP relies on the use of carefully timestamped packets to synchronize one or more slave clocks to a master clock.* Synchronous time information is distributed hierarchically, with a grand master clock at the root of the hierarchy. *The grand master provides the time reference for one or more slave devices. These slave devices can, in turn, act as master devices for further hierarchical layers of slave devices.*"[266]

310. The Broadcom Switching Accused Products implement a precision clock synchronization protocol for networked measurement and control systems.[267] The clock synchronization protocol "is applicable to distributed systems consisting of one or more nodes, communicating over a network. . . . The protocol provides a mechanism for synchronizing the clocks of participating nodes to a high degree of accuracy and precision."[268] "Clocks communicate with each other over a network. . . . PTP works on any packet-based system. PTP is designed to work in a multicast environment, although it is possible to design unicast PTP components and systems. Ethernet is an ideal network for implementing PTP."[269] The PTP provides synchronization of one or more nodes communicating over a distributed network system (such as Ethernet network) and

[266] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4 (emphasis added).

[267] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[268] IEEE Std 1588™-2008 at 16.

[269] *Id.* at 208.

may be implemented within distributed topologies, such as a daisy-chain topology.[270]

311. Additionally, the Broadcom Switching Accused Products include the Broadcom Ethernet Time Synchronization functionality, which "provides a switch- and PHY-only time synchronization solution, thereby eliminating the need for an external PTP ASIC and potentially freeing up an additional Ethernet interface."[271] The Broadcom ETS solution utilizes an optional feature of the IEEE 1588-2008 PTP standard, also known as IEEE 1588v2 Precision Time Protocol ("PTP").[272] The IEEE 802.1AS Timing and Synchronization protocol also implements the same PTP concepts for Ethernet.[273]

[270] *See, e.g.*, Get In Sync! IEEE1588v2 Transparent Clock Benefits for Industrial Control Distributed Networks, Microchip.com (March 22, 2012), https://ww1.microchip.com/downloads/aemDocuments/documents/OTH/ApplicationNotes/ApplicationNotes/GetinSync-WP.pdf.

[271] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 17.

[272] IEEE Std 1588™-2008; "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

[273] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

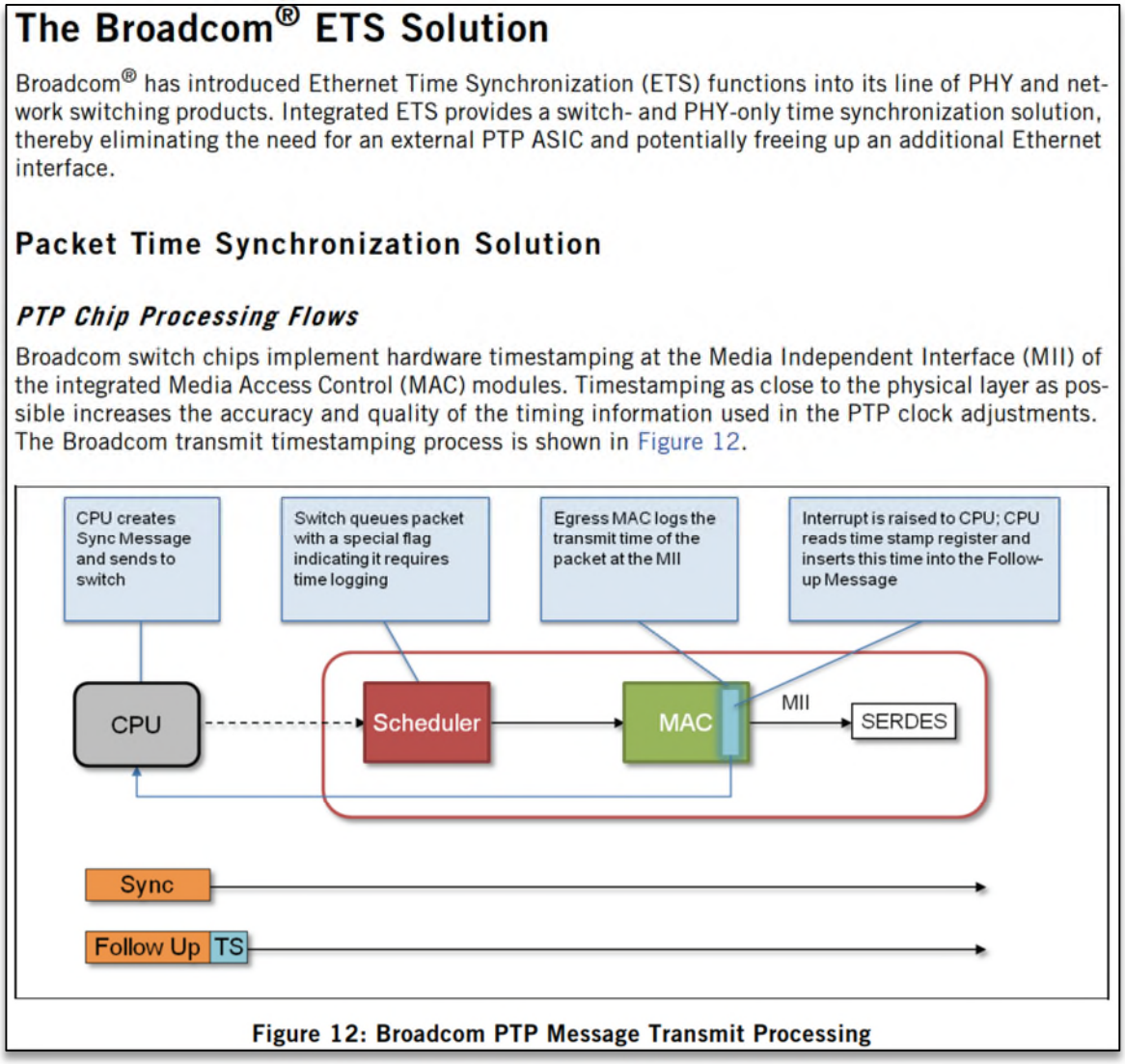

Figure 51. Explanation of Broadcom's PTP Message Transmit Processing.[274]

312. The Broadcom Switching Accused Products include "a timestamp component that captures timestamps and offsets from at least one network node."

313. The Broadcom Switching Accused Products utilize the PTP Link Delay Measurement Method, which "is performed as follows: 1. The delay requester transmits a Delay Request to its link partner and *captures the timestamp of the transmission time of this packet (t1).* 2. The Delay Request message is *received by the delay responder, capturing the packet's timestamp (t2).* 3. The delay responder issues two packets in response to the preceding request: a *Delay Response message and a Delay Response Follow-Up.* a. The *Delay Response conveys the Delay*

[274] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 4.

Request receive timestamp (t2). The delay responder *captures the transmit timestamp of this Delay Response (t3)* as it is transmitted. b. The *t3 transmit timestamp is then inserted into the Delay Response Follow-Up*. 4. The delay requester *captures the timestamp upon receipt of the Delay Response message (t4)*."[275]

314. In another example, the Broadcom Switching Accused Products receive messages "between the source clock and the sink clocks on the network."[276] These messages include Sync messages sent by the source clock to the sink clocks, containing "the current time as measured by the source clock" along "with an accurate timestamp that is generated at both the transmit time and receive time."[277]

315. In the IEEE 1588-2008 PTP standard, a "Sync message is transmitted by a master to its slaves."[278] The sync message "either contains the time of its transmission or is followed by a Follow_Up message containing this time."[279] "The message exchange pattern is as follows: a) The master sends a Sync message to the slave and notes the time t_1 at which it was sent" and "b) The slave receives the Sync message and notes the time of reception t_2."[280]

316. Once the Sync message is sent, the "<residenceTime>" is "added to the correctionField of the Sync event message by the egress port of the clock" which makes "any needed corrections to checksums or other content dependent fields of the message."[281] The Broadcom Switching Accused Products include one-step clock features including "On-the-fly egress packet modification including UDP checksum updates and CRC updates."[282] In this way, the Sync message

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[275] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5 (emphasis added).

[276] "Broadcom Ethernet Network Adapter User Guide," PTP Specification, Broadcom.com (last updated October 21, 2024), https://techdocs.broadcom.com/us/en/storage-and-ethernet-connectivity/ethernet-nic-controllers/bcm957xxx/adapters/Configuration-adapter/precision-time-protocol/ptp-specification.html.

[277] *Id.*

[278] IEEE Std 1588™-2008 at 42.

[279] *Id.*

[280] IEEE Std 1588™-2008 at 34.

[281] IEEE Std 1588™-2008 at 117.

[282] Broadcom BCM56072/BCM56071N Low-Power 440G Switch Data Sheet, Broadcom.com (September 28, 2020), https://docs.broadcom.com/doc/56072-56071N-DS1-PUB.

essentially includes a timestamp field, a checksum field, and the other content dependent fields according to the IEEE 1588 standard.

317. The Broadcom Switching Accused Products also include "a time synch component that identifies step changes to at least one master clock and synchronizes a local clock time of the at least one network node with the identified step change."

318. The Broadcom Switching Accused Products, as part of the PTP Link Delay Measurement, "[a]t the completion of the Delay Request/Response exchange, the "delay requester uses four timestamps (t1, t2, t3, t4) to compute the link delay. The link delay is computed as the average of the two one-way delays using the following formula:"[283]

$$T_{delay} = \frac{(t_2 - t_1) + (t_4 - t_3)}{2}$$

Figure 52. Broadcom's calculation of PTP Link Delay.[284]

319. In another example, the Broadcom Switching Accused Products calculate Drift Adjustment and Offset Adjustments, as shown below.[285] A Drift Adjustment is made if "the trend of slave offset values calculated from the Sync Messages continues to increase or decrease over time, the local reference clock that increments the free-running counter is operating at a rate slightly slower or faster than the master reference. A drift adjustment can be made to the freerunning counter by slightly increasing or decreasing the rate at which the counter increments. Doing so locks the frequency of the counter to the master reference (syntonization). Syntonization is the adjustment of a clock signal to match the frequency, but not necessarily the phase, of another clock signal."[286] Offset Adjustments are "applied to the local time value to synchronize the local time with the

[283] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[284] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 5.

[285] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[286] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

master's."

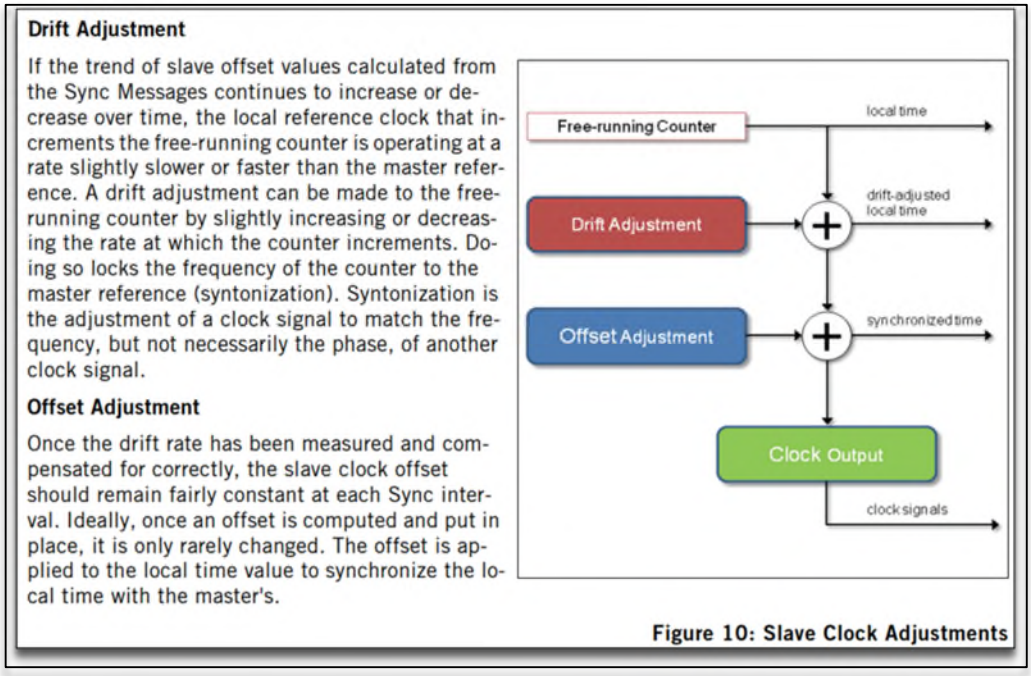
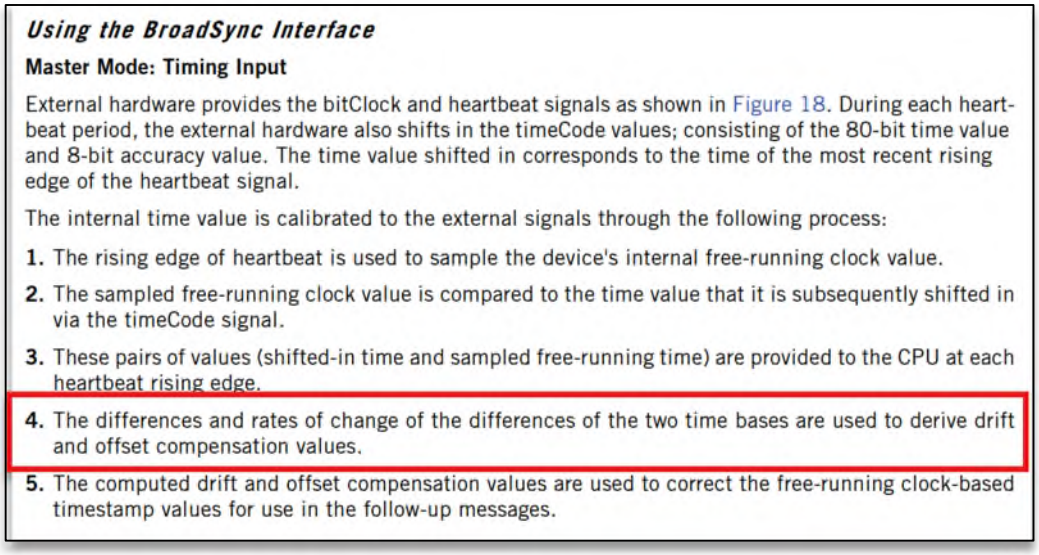


Figure 53. Describing slave clock adjustments according to Broadcom's PTP process.[287]

320. For example, in the precision time protocol utilized by the Broadcom Switching Accused Products determine if a step change has occurred, as shown below.[288]

[287] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[288] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.



Using the BroadSync Interface

Master Mode: Timing Input

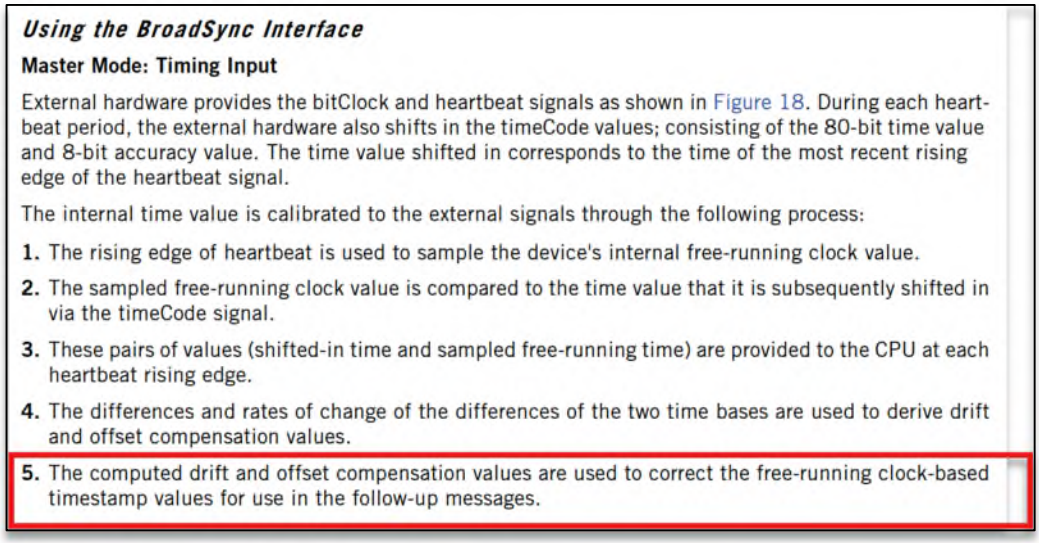
External hardware provides the bitClock and heartbeat signals as shown in Figure 18. During each heartbeat period, the external hardware also shifts in the timeCode values; consisting of the 80-bit time value and 8-bit accuracy value. The time value shifted in corresponds to the time of the most recent rising edge of the heartbeat signal.

The internal time value is calibrated to the external signals through the following process:

1. The rising edge of heartbeat is used to sample the device's internal free-running clock value.
2. The sampled free-running clock value is compared to the time value that it is subsequently shifted in via the timeCode signal.
3. These pairs of values (shifted-in time and sampled free-running time) are provided to the CPU at each heartbeat rising edge.
4. The differences and rates of change of the differences of the two time bases are used to derive drift and offset compensation values.
5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

Figure 54. Describing how drift and offset compensation values are derived.[289]

321. The Broadcom Switching Accused Products, for example, include a time synch component that identifies step changes to at least one master clock and synchronizes a local clock time of the at least one network node with the identified step change. [290] The second timestamp and associate delay response follow-up are updated if the step change occurred.



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5. The computed drift and offset compensation values are used to correct the free-running clock-based timestamp values for use in the follow-up messages.

[289] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[290] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

Figure 55. Describing how drift and offset compensation values are used to correct timestamp values.[291]

322. In another example, the "host CPU configures the drift and offset adjustment registers in the GTM based on the trend of slave offset and propagation delay values it calculates from received PTP messages.[292]

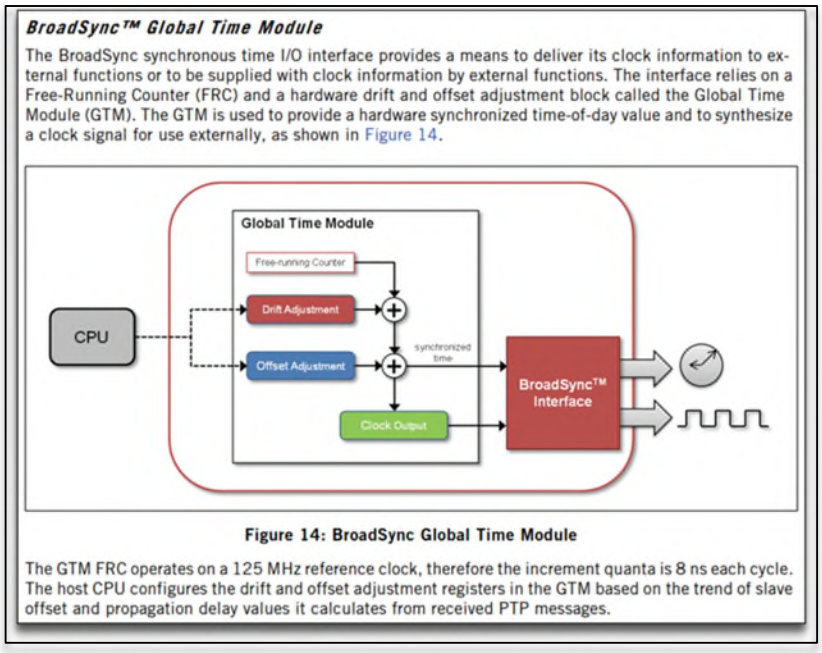

Figure 56. Describing the BroadSync Global Time Module's process to calculate drift and offset compensation values used to correct timestamp values.[293]

323. Accordingly, the Broadcom Switching Accused Products perform all steps of Claim 1 of the '751 Patent.

DIRECT INFRINGEMENT

324. Broadcom directly infringes the '751 Patent in multiple ways.

325. Broadcom directly infringes the '751 Patent at least when the Broadcom Switching Accused Products, automatically and by design, perform the steps of Claim 1 of the '751 Patent, in violation of at least 35 U.S.C. § 271(a).

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[291] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

[292] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 18.

[293] "Ethernet Time Synchronization Providing Native Timing Within the Network," Broadcom.com. (last accessed March 28, 2025) https://docs.broadcom.com/doc/1211168567832 at 8.

Figure 57. Broadcom's 440 Gb/s TSN Ethernet Switch with MACsec Encryption (BCM56070 series).[294]

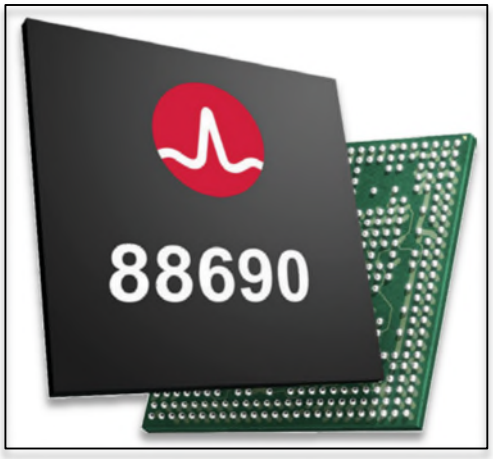

Figure 58. Broadcom's StrataDNX™ 10 Tb/s Scalable Switching Device (BCM88690).[295]

[294] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB.

[295] BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-PB100.

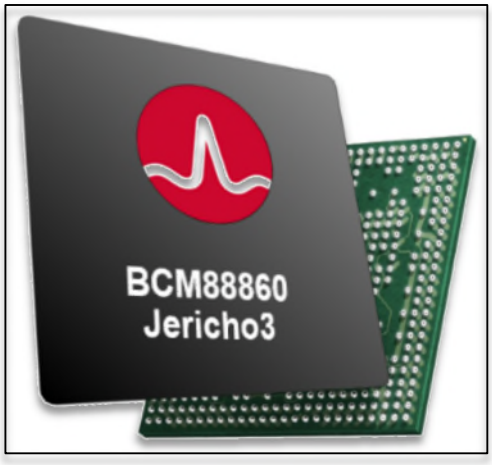

Figure 36. Broadcom's StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series (BCM88860).[296]

326. Broadcom offers to sell and sells the Broadcom Switching Accused Products on its website via a button to contact Broadcom's Sales Americas.

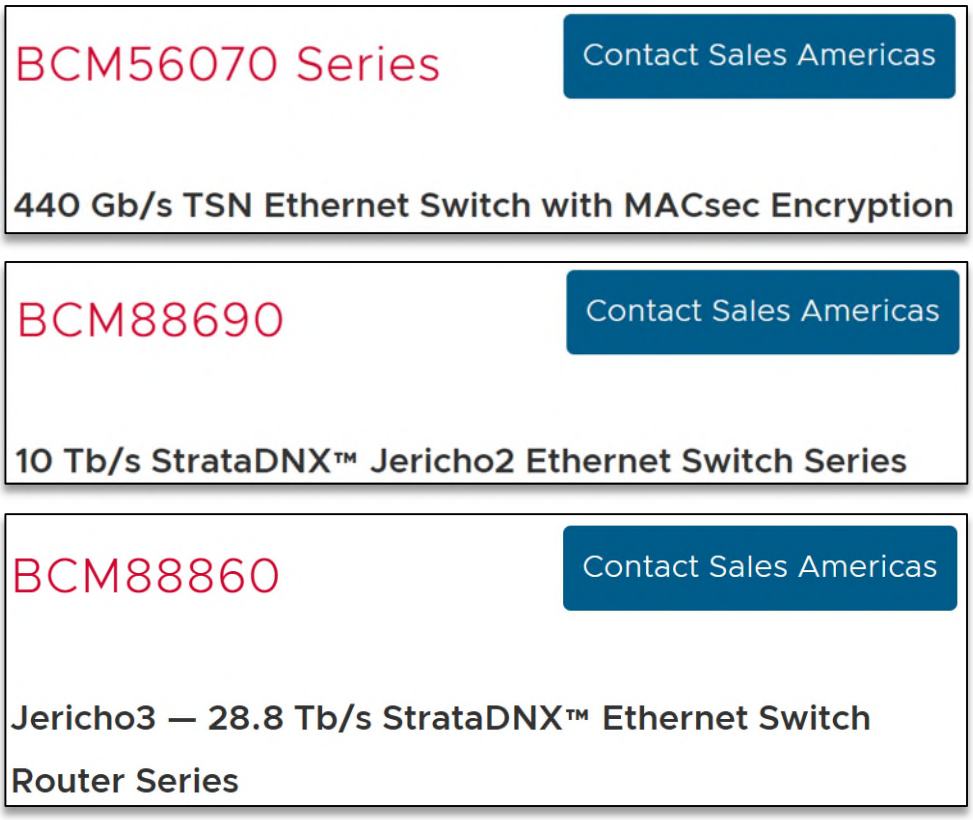

Figure 60. Broadcom offers the Broadcom Switching Accused Products for sale.[297]

[296] BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

[297] BCM56070, 440 Gb/s TSN Multilayer Switch Product Brief, Broadcom.com (copyright 2020), https://docs.broadcom.com/docs/56070-PB; BCM88690 StrataDNX™ 10 Tb/s Scalable Switching Device Product Brief, Broadcom.com (copyright 2018), https://docs.broadcom.com/doc/88690-

327. Broadcom also directly infringes by using the claimed method to demonstrate, test, install, and configure the Broadcom Switching Accused Products for its customers.[298]

328. Accordingly, Broadcom directly infringes the '751 Patent by selling the Broadcom Switching Accused Products and by using the Broadcom Switching Accused Products for testing and demonstrating performance of the Broadcom Switching Accused Products.

INDIRECT INFRINGEMENT: INDUCEMENT

329. Broadcom has had actual knowledge of the '751 Patent and its infringement by the Broadcom Switching Accused Products since at least April 15, 2025, when Netflix served a notice letter to Broadcom's and VMware's Legal Departments.

330. On December 23, 2024, Netflix sent a notice letter to Broadcom's and VMware's Legal Departments by email and on December 27, 2024 the same letter was served in hard-copy. *See* Exhibit D. That letter identified, for example, the '912 Patent, the infringing products associated with the '912 Patent, and a brief explanation tying an example claim of the '912 Patent to infringing activities. *See id.* Broadcom and VMware did not respond to that letter or otherwise alter its infringing conduct with respect to the '912 Patent.

331. Netflix sent a second notice letter to Broadcom's and VMware's Legal Departments that was served on April 15, 2025. *See* Exhibit E. Netflix reiterated in that letter that Broadcom and VMware should halt their infringing conduct with respect to the '912 Patent but also identified the '751 Patent. In addition to identifying the '751 Patent, that letter identified the infringing products associated with the '751 Patent and included a brief explanation tying an example claim of the '931 Patent to the infringing activities. Importantly, products identified with respect to the '912 Patent are the same as those identified in the second letter with respect to the '751 Patent and the accused functionality is similar. *See* Exhibits D and E.

332. Broadcom and VMware are sophisticated entities who have engaged in extensive patent litigation across the country. For example, Broadcom has been involved in no less than 45

PB100; BCM88860 StrataDNX™ 28.8 Tb/s StrataDNX™ Ethernet Switch Router Series Product Brief, Broadcom.com (copyright 2023), https://docs.broadcom.com/doc/88860-PB.

[298] *See, e.g.*, "10G/25G/50G/100G IEEE 1588 Optical PHY," Broadcom Inc. YouTube Channel, YouTube.com (June 2, 2021), https://www.youtube.com/watch?v=tq5cLOJ3DZY.

patent cases since 2002.[299] As another example, Broadcom has at least 83 IP professionals in its legal department.[300] Broadcom and VMware had ample time to review Netflix's notice of its infringing activities—especially given that the '751 Patent shares the same accused products and similar infringing functionality as the earlier noticed '912 Patent—and deliberately chose to not respond or alter their infringing behavior.

333. Broadcom has actively induced and continues to actively induce infringement of at least Claim 1 of the '751 Patent in violation of at least 35 U.S.C. § 271(b).

334. Broadcom's customers directly infringe at least Claim 1 of the '751 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way.

335. Broadcom has actively induced infringement of at least Claim 1 of the '751 Patent in violation of at least 35 U.S.C. § 271(b). Users of the Broadcom Switching Accused Products directly infringe at least Claim 1 of the '751 Patent when they use the Broadcom Switching Accused Products in the ordinary, customary, and intended way. Broadcom's inducement includes, without limitation and with specific intent to encourage the infringement, knowingly inducing consumers to use the Broadcom Switching Accused Products within the United States in the ordinary, customary, and intended way by, directly or through intermediaries, supplying the Broadcom Switching Accused Products to consumers within the United States and instructing and encouraging such customers to use the Broadcom Switching Accused Products in the ordinary, customary, and intended way, which Broadcom knows or should know infringes at least Claim 1 of the '751 Patent.

336. For example, Broadcom sells the Broadcom Switching Accused Products to its customers. When Broadcom's customers install the Broadcom Switching Accused Products and enable them for use, at least Claim 1 of the '751 Patent is performed. In at least this way, the customers of Broadcom directly infringe the '751 Patent while Broadcom knows of the '751 Patent, knows or should know that these activities infringe the '751 Patent, and specifically intends for its

[299] This information was collected from the Docket Navigator research tool by searching for the party "Broadcom Inc." Notably, this estimate does not include other Broadcom entities or subsidiaries.

[300] This information was collected by searching Broadcom's LinkedIn "People" tab, using the search "intellectual property OR patent OR trademark OR copyright," and limiting to individuals listed under "Legal."

customers to perform these activities.

337. Broadcom instructs its customers, at least through marketing, promotional, and instructional materials, to use the infringing Accused Products, as described in detail above. Broadcom creates and distributes promotional and product literature for the Accused Products that is designed to instruct, encourage, enable, and facilitate the user of the Accused Products to use the Accused Products in a manner that directly infringes the Patent. And Broadcom provides instructions, support, and technical assistance to its customers in support of committing the infringement.

338. One nonlimiting example of Broadcom's inducement includes Broadcom's BroadPTP 1588 Software Suite.[301] Broadcom's engineers provide specific instructions that Broadcom's BroadPTP solution can be used to implement at least Claim 1 of the '751 Patent in a variety of different use cases.[302] "BroadSync is a Broadcom software-firmware that runs on a StrataDNX/XGS internal ARM processor and it synchronizes the time-based events between a BroadSync-Master (source) and BroadSync-Slaves (sinks). . . . BroadPTP software combines a feature rich PTP stack with a highly flexible servo to provide an integrated and scalable PTP/IEEE 1588 solution."[303]

339. Broadcom encourages its customers to infringe the '751 Patent at least by instructing customers on how to infringe by providing software and "manuals and built in modules" in proximity to Broadcom products for customers to practice infringing conduct through the use of the BroadPTP and BroadSync software packages for use with Broadcom switch products.

340. Thus, Broadcom has induced its customers to infringe the '751 Patent. Broadcom's knowing inducement of its customers to infringe has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom's wrongful acts

[301] BroadPTP™ 1588 Software Suite, Broadcom.com https://www.broadcom.com/products/ethernet-connectivity/software/broadptp.

[302] *See, e.g.*, "High Port Density Timing Card for Next Gen Networks," Open Compute Project YouTube Channel, YouTube.com https://www.youtube.com/watch?v=lavW_621DMk&t=503s.

[303] "BroadSync™: Using your own PTP stack with Broadcom chips," ipInfusion.com (June 21, 2020), https://www.ipinfusion.com/resources/broadsync-using-your-own-ptp-stack-with-broadcom-chips/.

in an amount subject to proof at trial.

INDIRECT INFRINGEMENT: CONTRIBUTORY INFRINGEMENT

341. Broadcom has actively contributed to infringement of at least Claim 1 of the '751 Patent in violation of at least 35 U.S.C. § 271(c). Broadcom sells the Broadcom Switching Accused Products, which are especially adapted to practice the method claimed in at least Claim 1 of the '751 Patent.

342. The Broadcom Switching Accused Products have no substantial function or use other than to practice the invention claimed in at least Claim 1 of the '751 Patent at least because infringement of the claimed method is performed automatically when customers install and enable the Broadcom Switching Accused Products.

343. The Broadcom Switching Accused Products are material components of the claimed method recited in at least Claim 1 of the '751 Patent and are not a staple article or commodity of commerce, including because they are specifically configured to infringe according to at least Claim 1 of the '751 Patent (*see* ¶¶ 306-328).

344. Broadcom's contributory infringements include, without limitation, making, offering to sell, and/or selling within the United States, and/or importing into the United States, the Broadcom Switching Accused Products, which each include one or more components for use in practicing at least Claim 1 of the '751 Patent, knowing the component to be especially made or especially adapted for use in an infringement of at least Claim 1 of the '751 Patent (*see* ¶¶ 306-342), and not a staple article or commodity of commerce suitable for substantial non-infringing use.

WILLFUL INFRINGEMENT

345. As detailed above, Broadcom and VMware had knowledge of the '751 Patent and had knowledge, or were willfully blind, as to Broadcom's and VMware's infringement of the '751 Patent.

346. Broadcom and VMware's infringement of the '751 Patent has been willful and deliberate.

347. As discussed above, Broadcom and VMware have had knowledge of the '751 Patent since at least April 15, 2025, when Netflix sent a notice letter to Broadcom's and VMware's Legal

Departments.

348. As discussed above, Broadcom and VMware knew or should have known that their actions constitute infringement or recklessly disregarded those facts.

349. The willfulness facts for the '472 Asserted Patents, ¶¶ 141-149, *supra*, are incorporated by reference herein.

350. Broadcom and VMware have willfully infringed the '751 Patent. Broadcom and VMware's knowing and willful infringement has caused and continues to cause damage to Netflix, and Netflix is entitled to recover damages sustained as a result of Broadcom and VMware's wrongful acts in an amount subject to proof at trial.

PRAYER FOR RELIEF

Netflix respectfully requests the following relief:

A. That the Court enter judgment that Broadcom, VMware, or both in combination infringe each of the Asserted Patents;

B. That the Court award damages to Netflix for Broadcom's infringement, VMware's infringement, or both in combination, including interest;

C. That the Court award treble damages and attorneys' fees under 35 U.S.C. §§ 284 and 285 should Defendants' conduct warrant;

D. That the Court award Netflix an accounting for acts of infringement not presented at trial and an award by the Court of additional damage for any such acts of infringement;

E. That the Court award Netflix its statutory costs; and

F. That the Court award Netflix any and all other relief to which Netflix may be entitled and that the Court may deem just, equitable, and proper.

JURY DEMAND

Netflix respectfully demands a jury trial pursuant to Rule 38(b) of the Federal Rules of Civil Procedure on all claims and issues so triable.

Dated: May 22, 2025

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